Using EViews

For Principles of Econometrics, Fourth Edition

Using EViews

For Principles of Econometrics, Fourth Edition

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Bill Griffiths dedicates this work to Jill, David and Wendy Griffiths

Carter Hill dedicates this work to his wife, Melissa Waters

Guay Lim dedicates this work to Tony Meagher

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PREFACE

This book is a supplement to *Principles of Econometrics, 4th Edition* by R. Carter Hill, William E. Griffiths and Guay C. Lim (Wiley, 2011), hereinafter *POE4*. It is designed for students to learn the econometric software package EViews at the same time as they are using *POE4* to learn econometrics. It is not a substitute for *POE4*, nor is it a stand-alone computer manual. It is a companion to the textbook, showing how to do all the examples in *POE4* using EViews Version 7. For most students, econometrics only has real meaning after they are able to use it to analyze data sets, interpret results, and draw conclusions. EViews is an ideal vehicle for achieving these objectives. Others who wish to learn and practice econometrics, such as instructors and researchers, will also benefit from using this book in conjunction with *POE4*.

EViews is a very powerful and user-friendly program that is ideally suited for classroom use. You can find further details at the website **http://www.eviews.com**. The registration key that accompanies this book entitles you to download the Student Version of EViews 7 from this website. While the Student Version is perfectly adequate for handling most of the examples and exercises in POE4, it does have some limitations. A precise statement of these limitations relative to the capabilities of the full version of EViews is provided on the next page. Note that, unless you want to save a workfile, the Student Version will handle large data sets without any problems. Also, saving is often possible after deleting objects that are no longer relevant. Many students will, of course, have access to the full version of EViews in computer laboratories on campus.

The EViews workfiles for all the examples in *POE4*, and corresponding text definition files of the form *.*def*, can be found at **http://www.wiley.com/college/hill**. These data sets are also available at **http://principlesofeconometrics.com/poe4/poe4.htm**, along with errata for this book and for *POE4*.

With the exception of Chapter 1, the chapters in this book parallel the chapters in *POE4*. Thus, if you seek help for the examples in Chapter 11 of *POE4*, check Chapter 11 in this book. However, within a chapter, the section numbers in *POE4* do not necessarily correspond to the sections in this EViews supplement.

We welcome comments on this book and suggestions for improvement. We would like to acknowledge the valuable assistance of David Lilien, Glenn Sueyoshi, and Gareth Thomas from Quantitative Micro Software, the company that develops and distributes EViews. Of course, David, Glenn, Gareth and EViews are not responsible for any blunders that we may have committed.

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The Student Version of EViews 7

The EViews Student Version allows students to analyze datasets whose size is limited only by available computer memory. Instead of imposing hard limits on the size of datasets, the Student Version places "soft" capacity restrictions on the amount of data (1,500 observations per series, 15,000 total observations, 60 objects) that may be saved or exported. Students may, without restriction, work with larger amounts of data, but workfiles that exceed the soft limits may not be saved nor the data exported.

The Student Version is also restricted to interactive use since programming capabilities and batch-mode processing are not supported. Notable excluded features are X11, X12, and Tramo/Seats X-11 seasonal adjustment, solving model objects with more than 10 equations, storing EViews objects to databases, database autosearch, and redirection of print output to text or RTF files.

Lastly, the EViews Student Version license restricts use to a single machine by a single user. The user must be a currently enrolled student or currently employed faculty member. Note specifically that the restriction of the license to a single user implies that the Student Version is not licensed for use on public-access computers. The continued use of the Student Version beyond a 14-day grace period requires product activation/registration. Product activation takes seconds to perform using our automatic registration feature (for internet-connected computers). Registration may also be performed manually after obtaining a registration key via web browser or by contacting IHS EViews by telephone. In addition, the Student Version License will expire two (2) years after first use, and the Student Version will no longer run two years after the first activation.

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<u>CHAPTER</u> 1

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 - 1.8.8 Exporting data from EViews

KEYWORDS

1.1 USING EVIEWS FOR PRINCIPLES OF ECONOMETRICS, 4E

This manual is a supplement to the textbook *Principles of Econometrics*, 4th edition, by Hill, Griffiths and Lim (John Wiley & Sons, Inc., 2011). It is not in itself an econometrics book, nor is it a complete computer manual. Rather it is a step-by-step guide to using EViews 7.1 for the empirical examples in *Principles of Econometrics, 4th edition*, which we will abbreviate as *POE4*. We imagine you sitting at a computer with your *POE4* text and *Using EViews for Principles of Econometrics, 4th edition* open, following along with the manual to replicate the

examples in *POE4*. Before you can do this you must install EViews and obtain the EViews "*workfiles*," which are documents that contain the actual data.

1.1.1 Installing EViews 7.1

EViews 7.1 is distributed on a single CD-ROM. Its contents are:

Name	Date modified	Туре	Size
 Files Currently on the 	Disc (8)		
🐌 Docs	11/23/2009 4:13 PM	File folder	
鷆 EViews Illustrated Data	11/23/2009 4:10 PM	File folder	
🌗 Example Files	12/1/2009 11:53 AM	File folder	
🐌 Extras	11/23/2009 4:10 PM	File folder	
🕕 INSTALL	12/16/2009 5:57 PM	File folder	
🕮 Autorun	12/4/2009 11:55 AM	Application	1,756 KB
🗿 autorun	9/22/2007 7:09 PM	Setup Information	1 KB
📄 ReadMe	10/15/2009 10:39	Text Document	1 KB
	 EViews 7 Command Ref EViews 7 Getting Started EViews 7 Object Ref EViews 7 Users Guide I EViews 7 Users Guide II Readme 		

Within the Docs folder is a booklet called "EViews 7 Getting Started." It describes the installation and registration process. EViews is a Windows-based program. First close all other applications, then insert the CD into your computer's drive and wait until the setup program launches. If the CD does not spin-up on its own, navigate to the CD drive using Windows Explorer, and click on the Setup icon (AUTORUN.EXE).

1.1.2 Checking for updates

Once installed you should visit www.eviews.com and check the "**download**" link. There you will find any updates for your software. Alternatively, once EViews is installed set EViews to automatically update.

EV	/iews						
File	Edit	Object	View	Proc	Quick	Options Add-ins Window Help	
						General <u>O</u> ptions	
						<u>G</u> raphics Defaults	
						Database Registry	
						EViews Auto-Update from Web 🔹 🗸 Ch	neck for updates at startup
						<u>D</u> c	o not check for updates at startup
						Ch	neck now

1.1.3 Obtaining data workfiles

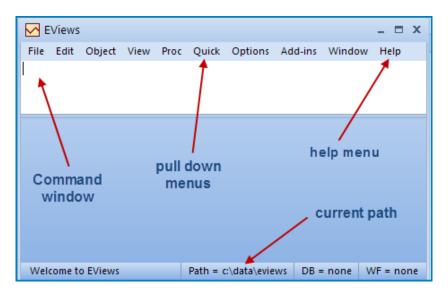
The **EViews data workfiles** (with extension *.wf1) and other resources for *POE4* can be found at www.wiley.com/college/hill¹. Find the link "Online resources for students." The *POE4* workfiles can be downloaded in a compressed format, saved to a subdirectory (we use c:\data\eviews), and then expanded. In addition to the EViews workfiles, there are **data definition** files (*.def) that describe the variables and show some summary statistics. The definition files are simple text files that can be opened with utilities like Notepad or Wordpad, or using a word processor. These files should be downloaded as well. Individual EViews workfiles, definition files, and other resources can be obtained from the author website www.principlesofeconometrics.com.

1.2 STARTING EVIEWS

To launch EViews, double-click the EViews 7 icon on the desktop, if one is present. It should resemble



Alternatively, select EViews 7 from the Windows Start Menu. When EViews opens you are presented with the following screen:

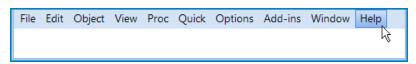


Across the top are **Drop Down Menus** that make implementing EViews procedures quite simple. Below the menu items is the **Command window**. It can be used as an alternative to the menus, once you become familiar with basic commands and syntax. Across the bottom is the **Current Path** for reading data and saving files. To change this, double-click path name and browse for a new folder. The EViews **Help Menu** is going to become a close friend.

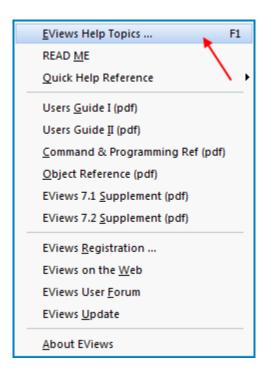
¹ There are a number of books listed by authors named Hill. *POE4* will be one of them.

1.3 THE HELP SYSTEM

Click **Help** on the EViews menu:

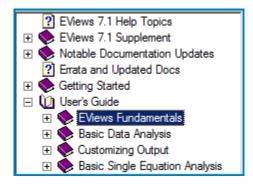


The resulting menu is



1.3.1 EViews help topics

First, click on **EViews Help Topics**. Select **User's Guide/EViews Fundamentals**. It opens a list of chapters that can take you through specifics of working with EViews. These guides will be a useful reference after you have progressed further through *Using EViews for POE4*.

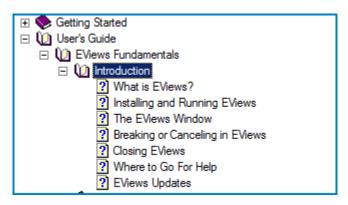


1.3.2 The read me file

On the **Help menu**, select **READ ME**. This opens a PDF file with the latest installation notes and errata.

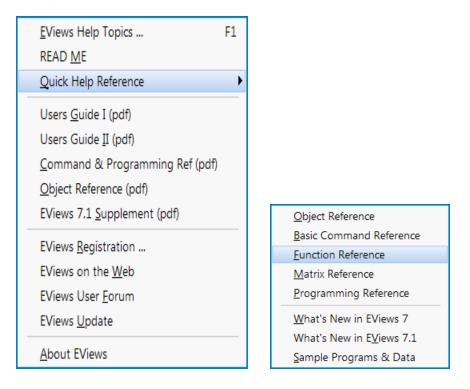
<u>E</u> Views Help Topics	F1
READ <u>M</u> E	
Quick Help Reference	>

Some basic questions about EViews 7 are answered by clicking Help/EViews Help Topics/ User's Guide/EViews Fundamentals/Introduction.



1.3.3 Quick help reference

Select **Quick Help Reference**. You find another menu. Select **Function Reference**.



EViews has many, many functions available for easy use.

EViews7	
Operator and Function Reference This material is divided into several topics:	
 <u>Operators</u>. <u>Basic mathematical functions</u>. 	
 <u>Time series functions</u>. <u>Financial functions</u>. 	
Descriptive statistics. Cumulative statistics functions. Moving statistics functions.	
Group row functions. By-group statistics.	_
 <u>Additional and special functions</u>. <u>Trigonometric functions</u>. 	
 <u>Statistical distribution functions</u>. <u>String functions</u>. 	~

You should just take a moment to examine the **Operators** (basic addition, multiplication, etc.) and the **Basic mathematical functions** (square roots, logarithms, absolute value, etc.). This **Function Reference** help is one that you will use very frequently, and to which we will refer a great deal.

1.3.4 User's guides and command reference

The User's Guide I, User's Guide II and Command Reference are the complete documentation for the full version of EViews 7. While these are good rainy-day reading, we do not necessarily suggest you search them for information until you are more familiar with the workings of EViews 7. This book, *Using EViews for POE4*, is an effort to guide you through the essentials of EViews 7 that are needed to replicate the examples in the book *POE4*.

1.4 USING A WORKFILE

As noted earlier, all the data for the book *Principles of Econometrics, 4th edition* is provided as EViews **workfiles**. These will be used starting in Chapter 2. To illustrate some aspects of working with EViews we use a sample data set provided with the software called *demo.wf1*. Under the Help menu, choose **Quick Help Reference/Sample Programs & Data:**

Help			
EViews Help Topics	F1	What's New in EViews 7	
READ <u>M</u> E			What's New in E <u>V</u> iews 7.1
Quick Help Reference	•		Sample Programs & Data

From among the choices select EViews 7 Manual Data:

EViews 7 Manual Data	Example data used in the EViews 7 User's Guide and the
	EViews 7 Command Reference.

In the list of topics open the folder for Chapter 2:

Chapter 19 - Additional Regression Tools
Chapter 2 - A Demonstration
Chapter 20 - Instrumental Variables and GMM

There you will find *demo.wf1*.

Name
🖳 Demo.xls
🔚 demo.wf1 ┥

Double-clicking the icon for *demo.wf1* will open it with EViews. However it has some additional objects created during the EViews demonstration. The plain EViews workfile *demo.wf1* can be found at www.principlesofeconometrics.com/eviews.htm. The contents of this workfile are described in the definition file *demo.def*, which is a simple text file found at www.principlesofeconometrics.com/def.htm.

demo.def Obs: 180	household	s 1952.1 -	1996.4			
year		year				
qtr gdp pr		quarter gross dome price leve	stic product			
ml rs		money supp		to		
Variable	Obs				Max	
Vallable					Max	
year			13.0234		1996	
qtr qdp		2.5 632.419		1 87.875	4 1948.225	
pr	180		.303483			
m1	180	445.0064	344.8315	126.537	1219.42	
rs	180	5.412928	2.908939	.8143333	15.08733	

1.4.1 Opening a workfile

Open the workfile called *demo* by clicking File/Open/Workfile.

EViews								
File Edit	Object	View	Proc	Quick	Options	Add-ins	Window	Help
<u>N</u> ew					•			
<u>O</u> pen					+	<u>E</u> Views	Workfile	Ctrl+O
<u>S</u> ave					Ctrl+S	<u>F</u> oreig	n Data as W	/orkfile

Navigate to where you have stored your EViews workfiles, then select *demo* and click on Open.

	हिंस crime हिंस csi हिंस demand हिंस demo	•						
Workfile: DE View Proc Obj Range: 19520 Sample: 19520	ect Print Save	Details+/- 208 obs	· ·	Fetch	Store	Delete	Genr	_ 🗖 🗙 Sample Filter: *
C gdp M m1 M pr resid M rs		inform	ation	on sa	ampl	e dat	a	
	ata series							
	ata series							

Located on the left side are data series that are indicated by the icon \mathbf{M} . EViews calls the elements of the workfile **objects**. As you will discover, there are many types of objects that EViews can save into the workfile—not only series but tables, graphs, equations, and so on. As Richard Startz says, an object is a little "thingie" that computer programmers talk about. Each little icon "thingie" in the workfile is an object.

In this workfile the data series, or variables, are:

- GDP—gross domestic product
- *M1*—money supply
- *PR*—price level (index)
- *RS*—short term interest rate

The series **resid** and the icon labeled β are always present in EViews workfiles (even new ones with no data) and their use will be explained later. Across the top of the workfile are various buttons that initiate tasks in EViews, and these too will be explained later.

Below the buttons is **Range: 1952:1 2003:4**, which indicates that the 208 observations on the variables included run from 1952, Quarter 1, to 2003, Quarter 4. **Sample: 1952:1 2003:4** denotes the data observations EViews will use in calculations. Many times we will choose for analysis less than the full range of observations that are available, so **Sample** will differ from **Range**.

1.4.2 Examing a single series

It is a good idea each time you open a workfile to look at one or more series just to verify that the data are what you expect. First, select one series:

🔟 w	orkfil	e: DEMO	- (c:\da	ita∖evi	iews\demo.v	vf1)					_ = >	x
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample	
		952Q1 2 952Q1 2									Filter:	*
BC Model Mo	dp											
∑ m ∑ pr												
M re M rs	sid											
	Demo	New P	Page /									

Double-click in the blue area, which will reveal a spreadsheet view of the data.

Series: G	5DP Workfile: DI	EMO::Demo\		_	ΞX
View Proc	Object Properti	es Print Name	Freeze Defa	ult 💌 Sort	Edit+/-
		GDF)		
	l	Last updated: 0	9/09/97 - 17:35	5	
	Disp	lay Name: gros	s domestic pro	oduct	
1952Q1	87.87500				
1952Q2	88.12500				
1952Q3	89.62500				
1952Q4	92.87500				
1953Q1	94.62500				
1953Q2	95.55000				
1953Q3	95.42500				
1953Q4	94.17500				
1954Q1	94.07500				
1954Q2	•				

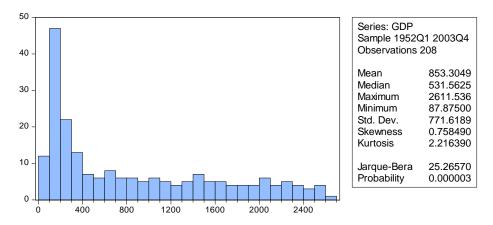
In the upper left hand corner is a button labeled **View:**



This opens a drop-down menu with a number of choices. Select **Descriptive Statistics & Tests/ Histogram and Stats**.

<u>S</u> preadSheet	GDP
<u>G</u> raph	ed: 09/09/97 - 17:35
	eu. 09/09/97 - 17.55
Descriptive <u>S</u> tatistics & Tests	Histogram and Stats
One-Way Tabulation	Stats Table
<u>C</u> orrelogram	Stats by <u>C</u> lassification
Long-run Variance	Simple <u>Hypothesis</u> Tests
<u>U</u> nit Root Test	Equality Tests by Classification
<u>V</u> ariance Ratio Test	Empirical Distri <u>b</u> ution Tests

The result is



This histogram is shown with various summary statistics on the side. Click on **View** again. Select **Graph**.

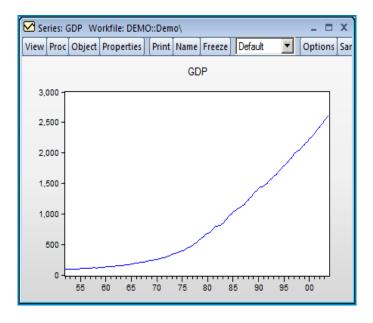
🖂 Se	eries: (GDP W	orkfile: DEM	IO::Dem					
View	View Proc Object Properties Print								
<u>S</u> preadSheet									
9	<u>G</u> raph								
[Descriptive <u>Statistics</u> & Tests								

There you will see many options. The default graph type is a **Basic Graph** with the **Line & Symbol** plotted. Select **OK**.

Graph Options				x
Option Pages	-Graph type	Details Graph data:	Raw data	
Basic type ⊕ Frame & Size ⊕ Axes & Scaling	Basic graph	Orientation:	Normal - obs axis on bottom	-
⊡. Legend ⊡. Graph Elements	Line & Symbol Bar Spike	Axis borders:	None	•
⊡ · Quick Fonts ⊡ · Templates & Objects	Area Dot Plot	Multiple series:	Single graph	

The result is a line graph. The dates are on the horizontal axis and *GDP* on the vertical axis.

Introduction to EViews 7.1 11



1.4.3 Changing the sample

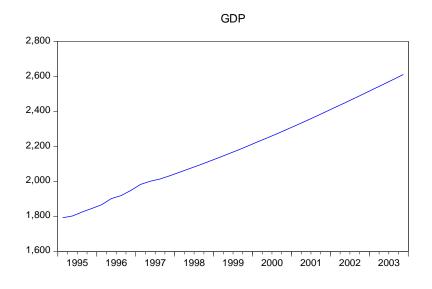
If you wish to view the graph or summary statistics for a different sample period, click on the **Sample** button. This feature works the same in all EViews windows.

🗹 Seri	ies: G	DP Wo	orkfile: DEM	O::Dem	0\					- 5	X
View	Proc	Object	Properties	Print	Name	Freeze	Default	•	Options	Sample	Genr
						GDP		-		•	

In the dialog box that opens change the sample to 1995q1 to 2003q4, then click **OK**.

P	Sample range pairs (or sample object to copy)
	1995q1 2003q4
	Change dates

The resulting graph shows that GDP rose constantly during this period.

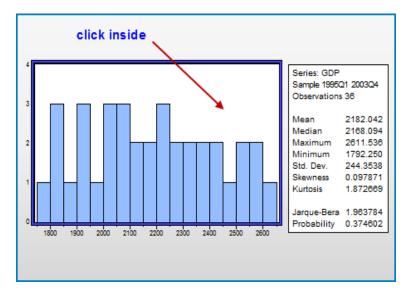


1.4.4 Copying a graph into a document

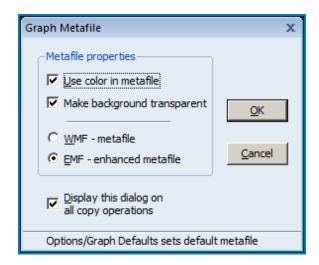
Select **View/Descriptive Statistics & Tests/Histogram and Stats**. You will now find the summary statistics and histogram of *GDP* for the period 1995:1 to 2003:4. These results can be printed by selecting the **Print** button.

Print

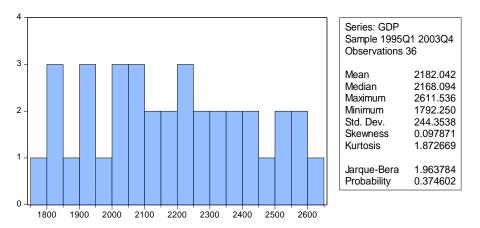
You may prefer to copy the results into a word processor for later editing and combining results. How can results be taken from EViews into a document? Click inside the histogram:



While holding down the **Ctrl** key, press **C** (which we will denote as **Ctrl+C**). This is the Windows keystroke combination for **Copy**.



In the resulting dialog box you can make some choices, then click **OK**. This copies the graph into the Windows clipboard (memory). Open a document in your word processor and enter **Ctrl+V**, which will **Paste** the figure into your document.



Close the graph we have been working on by clicking the X in the upper right-hand corner of the *GDP* screen:

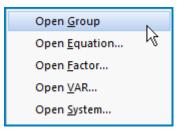
ľ	🗹 Se	ries: G	SDP Wo	orkfile: DEM	O::Dem	10\						- 📮	х
I	View	Proc	Object	Properties	Print	Name	Freeze		Sample	Genr	Sheet	Graph	Sta
				c	lose	GDP	-	-					

1.5 EXAMINING SEVERAL SERIES

Rather than examining one series at a time, we can view several. In the workfile window select the series M1 and then while holding down the **Ctrl**-key select the *PR* series. Double-click inside the blue area to open what is called a **Group** of variables.

View Proc Object Print Save Details+/- Show Fetch Store Range: 1952Q1 2003Q4 208 obs Sample: 1995Q1 2003Q4 36 obs	i w	orkfile	: DEMO -	(c:\da	ta∖evi	ews\demo.w	/f1)		
Sample: 1995Q1 2003Q4 36 obs B c gdp	View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store
j£ic ∑gdp	Rang	e: 19	952Q1 20	003Q4	l 1	208 obs			
	Sam	ple: 19	995Q120	003Q4	l 1	36 obs			
	<mark>₿</mark> C								
M m1									
	M m	1							
		aid			2				
resid ^K		sia			· \\				
∑ 15	⊠ 15								

Click on Open Group.



A spreadsheet view of the data will open.

GG	roup: I	UNTI	TLED	Wor	kfile: D	EMO::[)ei	mo∖								_	ΞX
View	Proc	Obj	ect	Print	Name	Freez	•]	Default		-	Sort	Transpo	ose∐	Edit+/-	Smpl+/-	Title	Sample
(obs				P	R			M1								
19	95Q	1		1.0	6940	9		1209.	235								
19	95Q	2		1.0	7463	3		1219.	420								
19	95Q	3		1.0	8018	7		1204.	5 20								
19	95Q	4		1.0	8613	3		1197.	609								-
19	96Q	1	•														

Note that the series begins in 1995:1 because we changed the Sample range in Section 1.4.3.

1.5.1 Summary statistics for several series

From the spreadsheet we can again examine the data by selecting the **View** button. Select **Descriptive Stats/Common Sample**.

Group: UNTITLED Workfile: I	DEMO::Demo\
[View]Proc]Object][Print]Name	e Freeze Default 🔽 Sort Transpose Ec
Group Members	K M1
<u>S</u> preadsheet	1209.235
Dated Data Table	3 1219.420
Graph	1204.520
	B 1197 609
Descriptive Stats	<u>Common Sample</u>
<u>C</u> ovariance Analysis	Individual Samples

The result is that a table of summary statistics is created for the two series (variables) in the group.

Group: UNTITLED Workfile: DEMO::Demo									
View Proc Object Pri			Sample	Sheet	Stats	Spec			
	F	R		M1					
Mean	1.16	8378	1	33 <mark>2</mark> .7	89				
Median	1.16	1	1336.818						
Maximum	1.281105 1499			499.4	80				
Minimum	1.06	1	1195.807						
Std. Dev.	0.06	1	101.9551						
Skewness	0.18	0.	0.070017						
Kurtosis	1.900155 1			5792	82				
	•								

1.5.2 Freezing a result

These results can be "saved" several ways. Select the **Freeze** button. This actually saves an image of the table. In the new image window, select the **Name** button. Enter a name for this image, which EViews calls an **Object**. The name should be relatively short and cannot contain any spaces. Underscores "" can be used to separate words to make recognition easier.

-Name to identify object—	
stats_table01	24 characters maximum, 16 or fewer recommended

Click **OK**, then close the **Object** by clicking on the **X**. Check back in the workfile and you will now see a new entry, which is the table you have created.

Í E	EVi	ews											- 🗆	х
	File	Edit	Oł	bject	View	Proc	Quick	Options	Add-i	ns W	/indow	Help		
	<u>۱</u>	Nork	file: [DEMO	- (c:\da	ta∖evi	ews\demo	o.wf1)					- 🗆	x
	View	w	oc 0	bject	Print	Save	Details+,	/-][Show	Fetch	Store	Delete	Genr	Sampl	le
							208 obs 36 obs						Filte	r: *
	B c G gdp M m1 P pr Presid Trs Ts Ts Tstats_table01 table object in workfile Path = c\data\eviews DB = none WF = demo													
L							Path	n = c:\dat	a\eviews	DB	= none	WF	= dem	no

The table can be recalled at any time by double-clicking the **Table icon:**

🗊 stats_table01

1.5.3 Copying and pasting a table

To copy these into a document directly, highlight the table of results (drag the mouse while holding down its left button) and enter **Ctrl+C**. In the resulting box click the **Formatted** radio button, check the box **Include header information**, and click **OK**. This copies the table to the Windows clipboard, which then can be pasted (**Ctrl+V**) into an open document.

Group: UNTITL	ED Workfile	e: DEMO::Demo\ 📃 🗖 🗙							
View Proc Object Print Name Econo Comple Cheet State Conc.									
PR Copy Precision									
Mean	1.1683	-Number copy method							
Median	1.1619								
Maximum	1.2811	Eormatted - Copy numbers as they ap							
Minimum	1.0694	O Unformatted - Copy numbers at higher							
Std. Dev.	0.0620								
Skewness	0.1869:	Include header information							
Kurtosis	1.9001	L							
		OK Cance							
.larque-Bera	2 02411								

	M1	PR
Mean	1332.789	1.168378
Median	1336.818	1.161996
Maximum	1499.480	1.281105
Minimum	1195.807	1.069409
Std. Dev.	101.9551	0.062083
Skewness	0.070017	0.186926
Kurtosis	1.579282	1.900155
Jarque-Bera	3.057073	2.024137
Probability	0.216853	0.363466
Sum	47980.40	42.06160
Sum Sq. Dev.	363819.2	0.134901
Observations	36	36

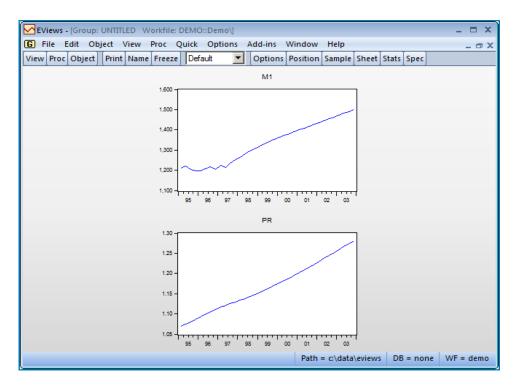
This same method can be used for any table in EViews. For example, if you open the saved table **STATS_TABLE01** you can highlight the results, then copy and paste as we have done here.

1.5.4 Plotting two series

Return to the spreadsheet view of the two series *M1* and *PR*. Select **View/Graph**. In the resulting dialog box, select **Multiple graphs** in the **Multiple series** menu.

Graph Options				\mathbf{k}	х
Option Pages Graph Type Basic type Axes & Scaling Caph Elements Quick Fonts Templates & Objects	Graph type General: Basic graph Specific: Line & Symbol Bar Spike Area Band Mixed with Lines Dot Plot Error Bar High-Low (Open-Close) Scatter XY Line XY Area Pie Distribution Quantile - Quantile Boxplot Seasonal Graph	To plot set	Raw data Normal - obs axis on bottom None Multiple graphs veral series choose ttiple graphs''		
Undo Page Edits			ОК Са	ancel	

Click **OK** to obtain two plots of the series.

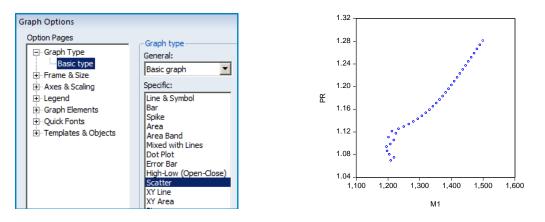


We can Freeze this picture, then assign it a Name for future reference.

1.5.5 A scatter diagram

A scatter diagram is a plot of data points with one variable on one axis and the other variable on the other axis. In the **Group** screen click **View/Graph**. For **Specific Graph type**, select **Scatter**.

Click **OK**. Copy the graph by clicking inside the graph area and entering **Ctrl+C** to copy, then paste into a document using **Ctrl+V**. Recall that we are still operating with the sample from 1995:1 to 2003:4, which is only 36 data points.



The variable *M1* is on the horizontal axis because it is the first series in the spreadsheet view.

Clicking the X in the Group window reveals some choices. The Group, consisting of the two series M1 and PR, can be saved by selecting Name and assigning a name.

	Object Name X
Delete Untitled Pelete Untitled GROUP? Store Yes No	Name to identify object group_m1_pr 24 characters maximum, 16 or fewer recommended Display name for labeling tables and graphs (optional) OK Cancel

In the workfile window you will find a new object for this group.

Workfile: DEMO - (c:\data\eviews\demo.wf1) _ 🗖 🗙									
View Proc Object Print Save Details+/- Show Fetch Store Delete Genr	Sample								
Range: 1952Q1 2003Q4 208 obs Sample: 1995Q1 2003Q4 36 obs	Filter: *								
C gdp G group_m1_pr Group containing M1 and F M m1 Pr Pr Pr resid Y rs fill stats_table01	۶R								
Demo (New Page /									

1.6 USING THE QUICK MENU

The spreadsheet view of the data is very powerful. Another key tool is the **Quick** menu on the EViews 7.1 workfile menu.

EV	/iews										
File	Edit	Object	View	Proc	Quick	Options	Add-ins	Window	Help		
	File Edit Object View Proc Quick Options Add-ins Window Help										

The options shown are

<u>S</u> ample	
<u>G</u> enerate Series	
S <u>h</u> ow	
G <u>r</u> aph	
E <u>m</u> pty Group (Edit Series)	
Ser <u>i</u> es Statistics	۲
Grou <u>p</u> Statistics	Þ
Estimate Equation	
Estimate <u>V</u> AR	

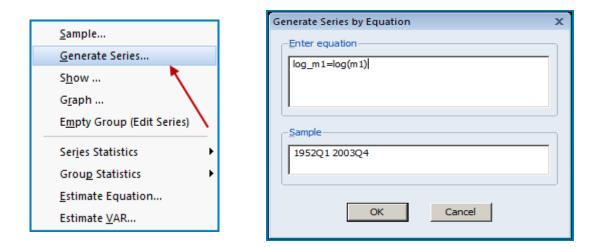
1.6.1 Changing the sample

By selecting **Sample** from this menu we can change the range of sample observations. Change the sample to 1952:1 to 2003:4 and click **OK**.

Sample Sample	X
Generate Series Show Graph Empty Group (Edit Series) Series Statistics Group Statistics Estimate Equation Estimate VAR	ok

1.6.2 Generating a new series

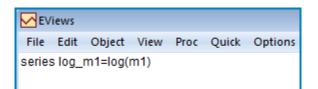
In each problem we may wish to create new series from the existing series. For example, we can create the natural logarithm of the series *M1*. Select **Quick/Generate Series**. In the resulting dialog box type in the equation **log_m1=log(m1)**, then click **OK**. A new series will appear in the workfile. The function **log** creates the natural logarithm. All logarithms used in *Principles of Econometrics* are natural logs.



Alternatively, we can generate a new series by selecting the **Genr** button on the workfile menu. This will open the same **Generate Series** dialog box.

Workfile: DEMO - (c:\data\eviews\demo.wf1) _ 🗖 🗙											
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
									Filter: *		

A third option is perhaps the simplest. Type into the EViews Command window



Then press **Enter**. Once a few basic commands are learned, a great deal of pointing-and-clicking can be avoided.

1.6.3 Plotting using Quick/Graph

We can create graphs from the spreadsheet view, but we can also use Quick/Graph.

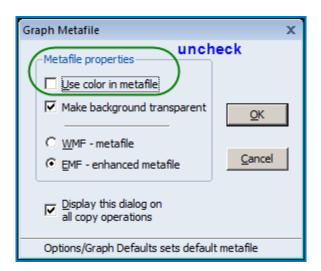
<u>S</u> ample		Series List	х
<u>G</u> enerate Series		List of series, groups, and/or series expressions	
S <u>h</u> ow		gdp	<u> </u>
G <u>r</u> aph			
E <u>m</u> pty Group (Edit Series)			
Ser <u>i</u> es Statistics	•		
Grou <u>p</u> Statistics	•		
Estimate Equation		OK Cancel	
Estimate <u>V</u> AR		Or Concer	

This will open the **Graph options** window. For a basic graph click **OK**.

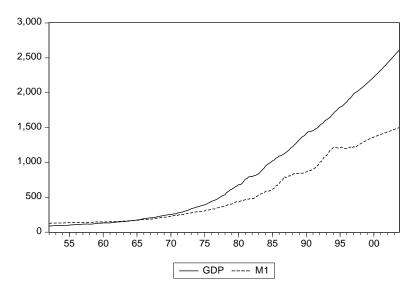
If you enter two series into the **Series List** window then the **Graph options** window will have an additional option. Here we will plot the two series in a single graph.

Series List X	
List of series, groups, and/or series expressions	- Details
gdp m1	Graph data: Raw data
	Orientation: Normal - obs axis on bottom
•	Axis borders: None
OK Cancel	Multiple series: Single graph

Click **OK**. The resulting graph shows the two series plots in a single window. In EViews the curves are in two different colors, but this will not show in a black and white document. The programmers at EViews have thought of this problem. Click inside the graph and enter **Ctrl+C** to copy. In the **Graph Metafile** box that opens, uncheck the box "**Use color in metafile**." Click **OK**.



In your document enter Ctrl+V to paste the black and white graph.



Now the graph lines show up as solid for GDP and broken for M1 so that the difference can be viewed.

Workfile: DEMO - (c:\data\eviews\demo.wf1) _ 🗖 🗙											
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
View Proc Object Print Save Details+/- Show Fetch Store Delete Genr Sample Range: 1952Q1 2003Q4 208 obs Filter: * Sample: 1952Q1 2003Q4 208 obs											

To save the graph, click **Name** and enter the name **GDP_M1_PLOT**. Click **OK**. Close the graph by clicking "X". You will find an icon in the workfile window.

🔟 gdp_m1_plot

If you double-click this icon, up will pop the graph you have created.

1.6.4 Saving your workfile

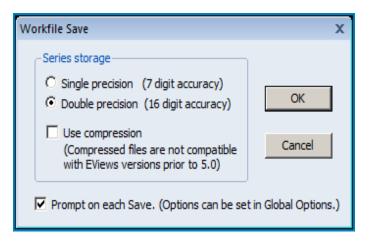
Now that you have put lots of work into creating new variables, plots, and so on, you can **Save** what you have done. On the workfile menu select the **Save** button

EVi	iews	- [Wo	rkfile:	DEM	IO - (c	:\data\	eviews'	∖demo	.wf1)]				-		x
G Fi	ile	Edit	Obje	ct ۱	/iew	Proc	Quick	Opt	tions	Add-in	is Wir	dow	Help		
														. 0	x
View	Pro	cObj	ect][I	Print	Save	Detail	s+/-][Show	Fetch	Store	Delete	Genr	Samp	le	
	Range: 1952Q1 2003Q4 208 obs Filter: * Sample: 1952Q1 2003Q4 208 obs														
Samp	ole: 1	19520	21 200	03Q4	:	208 ob)S								

In the following window, if you click **OK** then all the objects you have created will be saved into the workfile *demo.wf1*. You may wish to save these results using a different name, so that the original data workfile is not changed. To save the workfile, select **File/Save As** on the main EViews menu:

	🔀 EViews - [Workfile: DEMO - (c:\data\eviews\demo.wf1									
G	File Edit	Object	View	Proc	Quick	Option				
	New					•				
Vie	<u>O</u> pen			/		•				
Ra Sa	<u>S</u> ave					Ctrl+S				
	Save <u>A</u> s	s	*			·				
<mark>8</mark> ∑	<u>C</u> lose									

We will use the name *demo_ch1.wf1* for this workfile. Enter this and click **OK**. You will presented with some options. Use the default of **Double precision** and click **OK**.



You will note that the workfile name has changed.

1.6.5 Opening an empty group

The ability to enter data manually is an important one. In Section 1.8 we show several ways you might enter data into EViews. Select **Quick/Empty Group (Edit Series)** from the EViews menu.

<u>S</u> ample	
<u>G</u> enerate Series	
S <u>h</u> ow	
G <u>r</u> aph	
Empty Group (Edit Series)	
Ser <u>i</u> es Statistics	Þ
Grou <u>p</u> Statistics	۲
Estimate Equation	
Estimate <u>V</u> AR	

A spreadsheet opens in which you can enter new data. The default name for a new series is *SER01* that we will change. As you enter a number, press **Enter** to move to the next cell. You can add new data in as many columns as you like.

G G	G Group: UNTITLED Workfile: DEMO_CH1::Demo\													
View	/iew Proc Object Print Na		ame	Freeze		Def	ault	•	-	So	rt			
5	5													
ob)S			SER0)1	1								
195	2Q1	1	1.0	00000	0	×								
195	2Q2	2	2.0	00000	0									
195	2Q3	2	2.0	00000	0		def	a	ult	name	e			
195	2Q4	5	5.0	00000	0									
195	3Q1			N	IA									

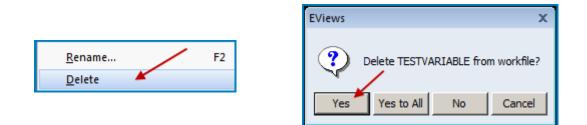
When you have finished entering the data you wish, click the X in the upper right corner of the active window. You will be asked if you want to "**Delete Untitled GROUP?**" Select Yes. In the workfile *demo_ch1.wf1* you will now find the new series labeled

Workfile: DEMO_CH1 - (c:\data\eviews\demo_ch1.wf1) X									
View Proc Object Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample	
Range: 1952Q1 2003Q4 208 obs Filter: * Sample: 1952Q1 2003Q4 208 obs									
B c ✓ gdp III gdp_m1_plot G group_m1_pr ✓ log_m1 ✓ m1	N) pr resid rs ser01 < stats_tabl	e01			creat	ed se	eries	
Demo New Page /									

To change this name, select the series (by clicking) then **right-click** in the shaded area. A box will open in which you can enter a new name for the "object," which in this case is a data series. Press **OK**.

Object <u>c</u> opy <u>E</u> xport to file		-Name to identify object 24 characters maximum, 16
<u>R</u> ename	₩ F2	testvariable or fewer recommended
<u>D</u> elete		-

You can go through these same steps to delete an unwanted variable, such as the one we have just created. Select the series *TESTVARIABLE* in the workfile, and right-click. Select **Delete**. In the resulting window you will be asked to confirm the deletion. Select **Yes**.



More than one series or objects can be selected for deletion by selecting one, then hold down the **Ctrl**-key while selecting others. To delete all these selected objects, **right-click** in the blue area, and repeat the steps above.

1.6.6 Quick/Series statistics

The next item on the EViews Quick menu is **Series Statistics**. Select **Quick/Series Statistics/Histogram and Stats:**

EViews - [Workfile: DEMO_CH1 - (c:\data\eviews\demo_ch1.wf1)]									
File Edit Object View Proc Quick Options Add-ins Window Help									
View Proc Object Print Save Detail	▲ <u>S</u> ample	enr Sample							
Range: 1952Q1 2003Q4 - 208 ob	Ocherate Seriesin								
Sample: 1952Q1 2003Q4 208 ob	S <u>h</u> ow	\mathbf{X}							
ß c ✓ gdp	G <u>r</u> aph								
<pre>gdp_m1_plot group_m1_pr</pre>	Empty Group (Edit Series)								
✓ log_m1									
₩ m1	Ser <u>i</u> es Statistics	<u>H</u> istogram and Stats							

In the resulting window you can enter the name of the series (one) for which you desire the summary statistics. Then select **OK**.

	Series: LOG_M1 Workfile: DEMO_CH1::Demo\ _ 🗖 🗙							_ 🗆 X	
	View	Proc Obje	ct Properties	Print N	lame Freeze	Sample G	ienr Sheet	Graph Stats Id	lent
Series Name 🗙	30	1						Series: LC	IG M1
Series name: log_m1 OK Cancel	25 20 15 10 5 0							Sample 19 Observation Mean Median Maximum Minimum Std. Dev. Skewness Kurtosis Jarque-Be Probability	6201 200304 6.000824 5.921902 7.312874 4.840535 0.851594 5.0130782 1.513848 bra 19.73454 7.000052
						Path = c	:\data\eview	/s DB = none	WF = demo_ch1

1.6.7 Quick/Group statistics

We can obtain summary statistics for a Group of series by choosing Quick/Group Statistics.

Quick Options Add-ins Wind	Quick Options Add-ins Window Help										
Sample	enr Sample										
<u>G</u> enerate Series											
S <u>h</u> ow											
G <u>r</u> aph											
Empty Group (Edit Series)											
Ser <u>i</u> es Statistics											
Grou <u>p</u> Statistics 🔹 🔻	Descriptive Statistics 🕨 🕨 Common sample										

Enter the series names into the box and press **OK**. This will create the summary statistics table we have seen before. You can **Name** this group, or **Freeze** the table, or copy and paste using **Ctrl+C** and **Ctrl+V**.

-List of series, groups, and/or series expres	sions
gdp m1 pr	A
1	v

Group: UNTITLED W	G Group: UNTITLED Workfile: DEMO_CH1::Demo\ _ □ X									
View Proc Object Pri	nt Name Freeze S	ample Sheet Stats !	Spec							
	GDP	M1	PR							
Mean	853.3049	569.3548	0.605202							
Median	531.5625	373.1375	0.490262							
Maximum	2611.536	1499.480	1.281105							
Minimum	87.87500	126.5370	0.197561							
Std. Dev.	771.6189	451.3036	0.365495							
Skewness	0.758490	0.726813	0.402946							
Kurtosis	2.216390	2.029020	1.620387 💽							
	•		▶ <i> </i> /,							

Another option under Quick/Group Statistics is Correlations.

Quick Options Add-ins	Wind	ow Help	
▲ <u>S</u> ample <u>G</u> enerate Series S <u>h</u> ow G <u>r</u> aph E <u>m</u> pty Group (Edit Series)		e Genr Sample	-
Ser <u>i</u> es Statistics	•		F
Grou <u>p</u> Statistics	•	Descriptive Statistics	+
Estimate Equation		Co <u>v</u> ariances	
Estimate <u>V</u> AR		Co <u>r</u> relations	7

Enter the names of series for which the sample correlations are desired and click **OK**.

Series List	x
List of series, groups, and/or series expressions—	
gdp log_m1 pr rs	
	T
OK Cancel	

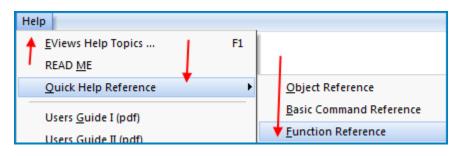
The sample correlations are arranged in an array, or matrix, format.

Introduction to EViews 7.1 29

G G	G Group: UNTITLED Workfile: DEMO_CH1::Demo\ _ □ ×													
View	Proc	Obj	ect	Print	Name	Freeze	Sam	ole	Sheet	Stats	Spec			
	Correlation													
				GDP		LOG_	M1		PR			RS		
(GDP		1	.0000	00	0.959	003		0.9865	551	0.1	6850	4	
LO	G_M	1	0	.9590	03	1.000000		0.987383		0.3	34636	4		
	PR		0	.9865	51	0.987383			1.000000		0.268010		0	
	RS		0.168504		04	0.346364		0.268010		1.000000		0		
			_											∠
			┛										<u></u>	//.

1.7 USING EVIEWS FUNCTIONS

Now we will explore the use of some EViews functions. Select Help/Quick Help Reference/ Function Reference.



1.7.1 Descriptive statistics functions

Select **Descriptive Statistics** from the list of material links.

This material is divided into several topics:	
<u>Operators</u> .	
Basic mathematical functions.	
<u>Time series functions</u> .	
<u>Financial functions</u> .	
Descriptive statistics.	
 <u>Cumulative statistics functions</u>. 	

Some of the descriptive statistics functions listed there are on the next page.

In this table of functions you will note that these functions begin with the "@" symbol. Also, these functions return a single number, which is called a **scalar**. In the commands the variables, or series, are called **x** and **y**. The bracket notation "[,s]" is optional and we will not use it. These functions are used by typing commands into the **Command window** and pressing **Enter**. For example, to compute the sample mean of *GDP*, type

scalar gdpbar = @mean(gdp)

The Command window looks like this.

EV	iews								
File	Edit	Object	View	Proc	Quick	Options	Add-ins	Window	Help
File Edit Object View Proc Quick Options Add-ins Window Help scalar gdpbar=@mean(gdp)									

At the bottom of the EViews screen you will note the message

GDPBAR successfully computed

In the workfile window the new object is denoted with "#", which indicates a scalar.

≢ gdpbar

We called the sample mean **GDPBAR** because sample means are often denoted by symbols like \overline{x} which is pronounced "x-bar." In the "text-messaging" world in which you live, simple but meaningful names will occur to you naturally.

To view this scalar object double-click on it: it opens in a spreadsheet view.

🗰 Scalar: GDPBA	# Scalar: GDPBAR Workfile: DEMO_CH1::Demo\ 🗕 🗖 🗙							
View Proc Obje	ct Print Name	Freeze	Edit+/-					
853.304863221	853.3048632211539							
	Value							
GDPBAR	853.3049							
		Path	n = c:\dat	a\eviews	DB = none	WF = der	mo_ch1	

The sample mean of *GDP* during the sample period is 853.305.

Scalars you have created can be used in further calculations. For example, enter the following commands by typing them into the Command window and pressing **Enter:**

```
scalar t = @obs(gdp)
scalar gdpse = @stdev(gdp)
scalar z = (gdpbar-800)/(gdpse/@sqrt(t))
```

Function	Name	Description
<pre>@cor(x,y[,s])</pre>	correlation	the correlation between X and Y.
<pre>@covs(x,y[,s])</pre>	sample covariance	the covariance between X and Y (division by $n-1$).
<pre>@inner(x,y[,s])</pre>	inner product	the inner product of X and Y.
<pre>@kurt(x[,s])</pre>	kurtosis	kurtosis of values in X.
<pre>@mae(x,y[,s])</pre>	mean absolute error	the mean of the absolute value of the difference between X and Y.
<pre>@mape(x,y[,s])</pre>	mean absolute percentage error	100 multiplied by the mean of the absolute difference between X and Y, divided by Y.
@max(x[,s])	maximum	maximum of the values in X.
<pre>@mean(x[,s])</pre>	mean	average of the values in X.
<pre>@median(x[,s])</pre>	median	computes the median of the X (uses the average of middle two observations if the number of observations is even).
@min(x[,s])	minimum	minimum of the values in X.
<pre>@prod(x[,s])</pre>	product	the product of the elements of X (note this function is prone to numerical overflows).
@obs(x[,s])	number of observations	the number of non-missing observations for X in the current sample.
<pre>@rmse(x,y[,s])</pre>	root mean square error	the square root of the mean of the squared difference between X and Y.
@skew(x[,s])	skewness	skewness of values in X.
<pre>@stdev(x[,s])</pre>	standard deviation	square root of the unbiased sample variance (sum-of-squared residuals divided by n−1).
@sum(x[,s])	sum	the sum of X.
<pre>@sumsq(x[,s])</pre>	sum-of-squares	sum of the squares of X.
<pre>@theil(x,y[,s])</pre>	Theil inequality coefficient	the root mean square error divided by the sum of the square roots of the means of X squared and Y squared.
<pre>@vars(x[,s])</pre>	sample variance	sample variance of the values in X (division by $n-1$).

Selected Descriptive Statistics Functions in EViews 7.1

1.7.2 Using a storage vector

The creation of scalars leads to inclusion of additional objects into the workfile, and the scalars cannot be viewed simultaneously. One solution is to create a storage vector into which these scalars can be placed.

On the EViews menu bar select **Object/New Object**. In the resulting dialog box select **Matrix-Vector-Coef** and enter an object name, say **DEMO**. Click **OK**.

	New Object	х
File Edit Object View Proc Quid scalar t = @ New Object Image: Scalar gdps Image: Scalar z = (c Image: Eetch from DB	Type of object Name for object Matrix-Vector-Coef demo Equation factor Graph Group LogL Matrix-Vector-Coef Model Pool	ject

A dialog box will open asking what type of "new matrix" you want. To create a storage vector (an array) with 10 rows, select the radio button **Vector**, enter 10 for Rows, and click **OK**.

New Matrix	x
Type O Matrix O Symmetric Matrix O Vector O Coefficient Vector	Dimension Rows: 10 Columns: 1
ОК	Cancel

A spreadsheet will open with rows labeled R1 to R10. Now enter into the Command window the command

demo(1) = @mean(gdp)

When you press Enter the value in row R1 will change to 853.3049, the sample mean of GDP.

File	Edit	Object	View	Proc	: Qu	uick	Option	s Add	-ins \	Vindo
	_	bar = @n @mean(dp)						
demo	(1)-	winean	gab)	ſ	l) v	ector	DEMO	Workfi	le: DEN	10_CH
				=[View	Proc	Object	Print	Name	Freez
	Vorkfil	e: DEMO	_CH1 - (c:\di						[
View	Proc	Object	Print	Save			С	1		
Ran	ge: 1	952Q12	003Q4						Last u	pdate
Sam	ple: 1	952Q1 2	003Q4		$\left(\right)$					
ßc					(R	1	85	3.3049)	
	orr_ta	ble01			R	2	0.0	00000		
🔲 d	emo				R	3	0.0	00000		

Now enter the series of commands, pressing Enter after each.

demo(2)=@obs(gdp) demo(3)=@stdev(gdp) demo(4)=(gdpbar-800)/(gdpse/@sqrt(t))

Each time a command is entered a new item shows in the vector. Note that in the last command could be included the previously calculated members of the vector **demo.** That is,

demo(4) = (@mean(gdp)-800) / (@demo(3)/@sqrt(demo(2)))

U Vecto	🗓 Vector: DEMO Workfile: DEMO_CH1::Demo\ 💶 🗖 🗙							
[View]Pro	oc Object Print	Name	Freeze	Edit+/-	Label+/	Sheet		
	DEMO							
	C1							
R1	853.3049							
R2	208.0000							
R3	771.6189							
R4	0.996313					-		
R5	•							

The advantage of this approach is that the contents of this table can be copied and pasted into a document for easy presentation. Highlight the contents, enter **Ctrl+C**. Choose the **Formatted** radio button and **OK**.

Workfile: DFMO_CH1 - (c:\data\eviews\demo_ch1.wf1)								
View Proc Ob								
Range: 1952)bject Print Name F						
Sample: 1952			Number copy method					
ß c ₿ demo		C1	Eormatted - Copy numbers as they appear in table					
gdp		Last up	C Unformatted - Copy numbers at highest precision					
🔲 gdp_m1_p								
🗰 gdpbar 🗱 gdpse	R1	853.3049	<u>O</u> K <u>C</u> ancel					
G group_m1	R2	208.0000						
⊠ log_m1 ⊠ m1	R3	771.6189						
🗹 pr	R4	0.996313						
🗹 resid	D5	•						

In an open document enter Ctrl+V to paste the table of results.

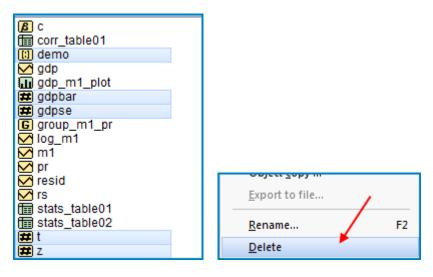
853.3049
208.0000
771.6189
0.996313

You can now edit as you would any table.

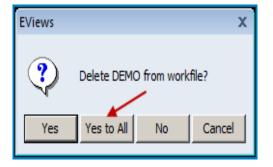
Demo vector	
GDP mean	853.3049
T sample size	208.0000
GDP Std Dev	771.6189
Z statistic	0.996313

We created many tables in the book Principles of Econometrics using this method.

To keep our workfile tidy, delete the scalar and vector objects that have no further use. Click the vector object **DEMO** and then while holding down the **Ctrl**-key, click on the scalars. Right-click in the blue-shaded area and select **Delete**.



If you feel confident you can choose **Yes to All**:



1.7.3 Basic arithmetic operations

The basic arithmetic operations can be viewed at Help/Quick Help Reference/Function Reference:



The list of operators is given on the next page. These operators can be used when working with series, as in an operation to generate a new series, RATIO1, defined as 3 times the ratio of GDP to M1:

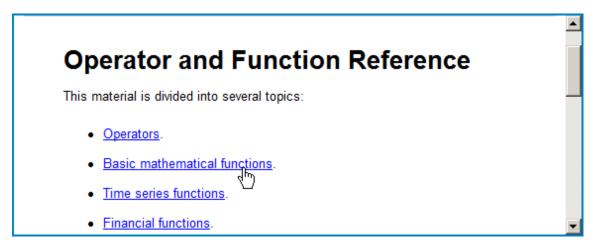
series ratio1 = 3*(gdp/m1)

Expression	Operator	Description		
+	add	x+y adds the contents of X and Y.		
-	subtract	x-y subtracts the contents of Y from X.		
*	multiply	x*y multiplies the contents of X by Y.		
/	divide	x/y divides the contents of X by Y.		
^	raise to the power	x^y raises X to the power of Y.		
>	greater than	x>y takes the value 1 if X exceeds Y, and 0 otherwise.		
<	less than	x <y 0="" 1="" and="" exceeds="" if="" otherwise.<="" takes="" td="" the="" value="" x,="" y=""></y>		
=	equal to	x=y takes the value 1 if X and Y are equal, and 0 otherwise.		
<>	not equal to	x<>y takes the value 1 if X and Y are not equal, and 0 if they are equal.		
<=	less than or equal to	x<=y takes the value 1 if X does not exceed Y, and 0 otherwise.		
>=	greater than or equal to	x>=y takes the value 1 if Y does not exceed X, and 0 otherwise.		

Basic Arithmetic Operations

1.7.4 Basic math functions

The basic math functions can be viewed at Help/Quick Help Reference/Function Reference.



Some of these functions are listed below. Note that common ones like the absolute value (**abs**), the exponential function (**exp**), the natural logarithm (**log**), and the square root (**sqr**) can be used with or without the @ sign.

Name	me Function Examples/Description	
<pre>@abs(x), abs(x)</pre>	absolute value	@abs(-3)=3.
<pre>@exp(x), exp(x)</pre>	exponential, e ^x	@exp(1)=2.71813.
<pre>@fact(x)</pre>	factorial, x!	@fact(3)=6, @fact(0)=1.
@inv(x)	reciprocal, 1/x	inv(2)=0.5.
@mod(x,y)	floating-point remainder	returns the remainder of x/y with the same sign as x. If y=0 the result is 0.
<pre>@log(x), log(x)</pre>	natural logarithm, log _e (x)	@log(2)=0.693, log(@exp(1))=1.
@round(x)	round to the nearest integer	@round(-97.5)=-98, @round(3.5)=4.
<pre>@sqrt(x), sqr(x)</pre>	square root	@sqrt(9)=3.

Selected Basic Math Functions

1.8 CREATING WORKFILES

If you are fortunate enough to have your data in the form of an EViews workfile, then you can simply open that file and proceed with the various commands that we describe in the following chapters. The EViews workfile can be opened in one of three ways: (1) by using **File/Open/Workfile** as described in Section 4.1.1, (2) by double-clicking the icon of the file name, or (3) by selecting the file and, holding the left-mouse button, dragging it to the EViews icon on the desktop.

Suppose, however, that you need to collect your data, and the data are available in another format, such as an Excel file or a text file. How do you create an EViews workfile that contains the required data? We begin to answer this question by exploring how to download data from the Internet into an Excel file; then we examine ways of creating an EViews workfile from an Excel file or a text file.

1.8.1 Obtaining data from the Internet

Getting data for economic research is much easier today than it was years ago. Before the Internet, hours would be spent in libraries, looking for and copying data by hand. Now we have access to rich data sources that are a few clicks away.

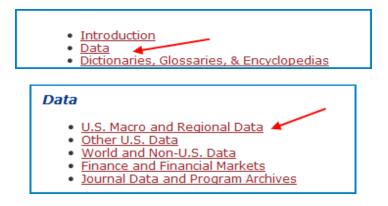
Suppose you are interested in analyzing the GDP of the United States. As suggested in *POE4*, the website **Resources for Economists** contains a wide variety of data, and in particular the macro data we seek.

Websites are continually updated and improved. We will guide you through an example, but be prepared for differences from what we show here.

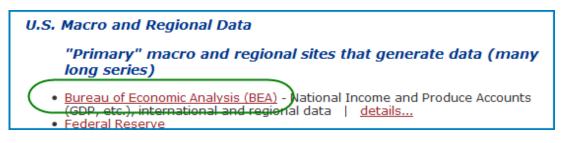
First, open up the website: http://www.aeaweb.org/rfe/:



Select the Data option, and then select U.S. Macro and Regional Data.



This will open up a range of sub-data categories. For the example considered here, select the **Bureau of Economic Analysis (BEA)-National Income and Produce Accounts** to get data on GDP.



From the screen below, select the Gross Domestic Product option.

U.S. Economic Accounts
National Gross Domestic Product (GDP) Personal Income and Outlays Consumer Spending Corporate Profits Fixed Assets Research and Development Satellite Account

Most websites allow you to download data conveniently in Excel format.

Gross Domestic Product (GDP)	
News Release: Gross Domestic Product	
tincludes highlights, technical note, and associated tables	
Current-dollar and "real" GDP (Excel)	
 Percent change from preceding period (Excel) 	

Select the Excel option and a dialog box will open. Save the data as gdplev.xls.

Opening gdplev.xls	×
You have chosen to open	
🗃 gdplev.xls	
which is a: Microsoft Excel 97-2003 Worksheet	
from: http://www.bea.gov	
What should Firefox do with this file?	
O Open with Microsoft Excel (default)]
Save File]
Do this automatically for files like this from now on.	
OK Canc	el

•

Once the file has been downloaded we can open the file; a sample of the data in Excel format is shown below.

🔊 gdplev [Compatibility Mode] 👝 🗉 🔀								
	А	В	С	D	E	F	G	Η 🚆
1		Current-D	ollar and '	'Real" Gro	ss Domest	ic Product		
2								
3		Annual				Quarterly		
4					(Seasonall	y adjusted a	annual rate	s)
5								
		GDP in billions of current	GDP in billions of chained 2005			GDP in billions of current	2005	
6		dollars	dollars			dollars	dollars	
7								
8								
9	1929	103.6	977.0		1947q1	237.2		
10	1930	91.2			1947q2	240.4		
11	1931	76.5	834.9		1947q3	244.5	1,768.0	
12	1932	58.7	725.8		1947q4	254.3	1,794.8	
13	1933	56.4	716.4		1948q1	260.3	1,823.4	-
H 4 > > Sheet1 🖓								

Let us now create the desired EViews file by importing the annual data (1929-2010) for nominal GDP (column B, first observation in cell B9) and real GDP (column C, first observation in cell C9) into an EViews workfile.

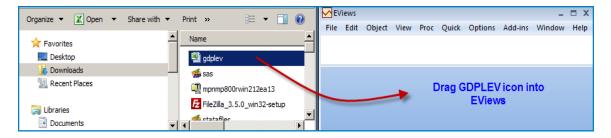
1.8.2 Importing an Excel file: drag and drop

EViews makes it very easy to import data from a variety of formats. For example, Excel 97-2003 and text (ASCII) files can be imported by "dragging and dropping."

Remark: EViews imports Excel 97-2003 files, ending in *.*xls*, with no difficultly. If, however, you have a newer Excel file, ending in *.*xlsx*, then you may have problems. The solution is to open the *.*xlsx* file and save it under the older format before importing.

Excel 97-2003 Workbook

Highlight the file to be imported and hold down the left-mouse button. If EViews is open, drag the file icon into EViews as shown below. If EViews is not open, you can drag the file icon onto the EViews icon on the desktop.



Then there will be a series of confirmatory screens. Usually the default settings are fine and we just click **Next.** In the screen shot below we have edited the image a bit, cutting out some of the data lines to make it smaller.

Excel 97-2003 Read - Step 1 of 3	x
Cell Range	
Predefined range	Sheet: Sheet1
Sheet1	Start cell; \$A\$9
C Custom range Sheet1!\$A\$9:\$C\$90	End cell: \$C\$90
1929 103.6 977 1938 86.1 992.6 Image edite	d 🔪
Cancel	< Back Next > Finish

In Step 2 we have an opportunity to give the series names.

Excel 97-2003 Read - Step 2 of 3	x
Column headers Header lines: 0 📑 Header type: Names only 💌 Clear Edited Column Info	Column info Click in preview to select column for editing Name: Real_GDP Description:
Text representing NA #N/A Year GDP Real GDP	Data type: Number
1929 103.6 977 1930 91.2 892.8 1931 76.5 834.9 1932 58.7 725.8 1933 56.4 716.4 1934 66 794.4 1935 73.3 865 1936 83.8 977.9	Choose a name for each variable
	Cancel < Back Next > Finish

In Step 3 we can define the basic structure of the workfile, which in this case is **Dated** with a **regular annual frequency**, with the **start date** of 1929.

Excel 97-2003 Read - Step 3	of 3	х
Import method Create new workfile Import options Rename Series Frequency Conversion	Structure of the Data to be Imported Basic structure Dated - regular frequency Start date: 1929	

Click **Finish** and there you have it.

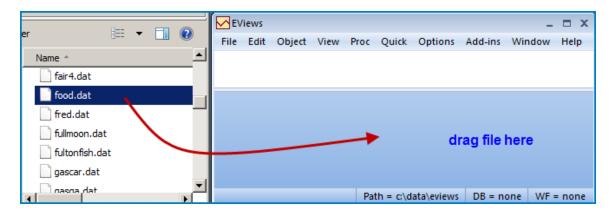
EViews - [Workfile: GDPLEV - (c:\data\eviews\gdplev.wf1)]	- 🗆 X
File Edit Object View Proc Quick Options Add-ins Window	Help
	_ # X
View Proc Object Print Save Details+/- Show Fetch Store Delete Gen	Sample
Range: 1929 2010 82 obs	Filter: *
Sample: 1929 2010 82 obs	
B c B ada	
፼ gdp real_gdp	
resid	
Vear vear	
Gdplev New Page	
Path = c\data\eviews DB = none W	= gdplev

1.8.3 Importing a text data file: drag and drop

EViews supports the "drag-and-drop" approach for a number of different software formats. Let's give it a try using an ASCII, or text format, data file. The data files for *POE4* in text format are located at http://www.principlesofeconometrics.com/poe4/poe4dat.htm. These files have a *.dat extension. We will use *food.dat*. The first few observations are:

115.22	3.69
135.98	4.39
119.34	4.75
114.96	6.03
187.05	12.47

Download the file from the internet, and then drag it into EViews or onto the EViews icon on the desktop. Select the file, then holding the left-mouse button, slide the mouse.



We then have a series of screens checking if the data match your expectations. In each, if all looks good, click **Next**.

Text Read - Step 1 of 4	x
Please examine the preview window If the rows and columns appear to be correct, click on the Finish button to read your data into EViews. To adjust the column breaks, choose a column type from the list on the right, then click Next to continue. To adjust the row breaks, click on the following	Column specification Column specification
Show row options	Skip lines: 0
135.98 4.39 119.34 4.75	

Text Read - Step 2 of 4	x
Delimiters Standard delimiter: 1 or more spaces Custom delimiters Enter list of delimiters - Use 'T' for tab and 'A' for all alpha Treat consecutive delimiters as one	Other options Don't split quoted fields Quote character(s): or '
1- 115.22 3.69 2- 135.98 4.39 3- 119.34 4.75	-

In Step 3 we can change the default names of each column.

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Text Read - Step 3 of 4		x
Column headers Header lines: Header type: Names only Clear Edited Column Info	Column info Column info Click in preview to select column for editing Series01 Description:	
	Data type: Number	
Series01 115.22 135.98 4.39		

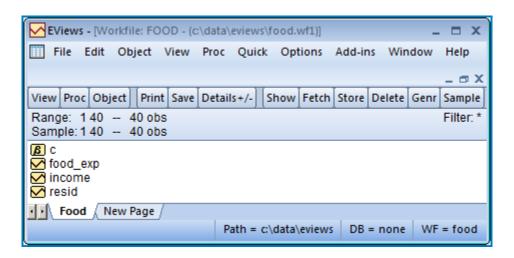
As you select each column, enter a name for that series, then highlight the next column and repeat.

Text Read - Step 3 of 4	x
Column headers Header lines: 0 :: Header type: Names only Clear Edited Column Info Text representing NA food explanation	Click in preview to select column for editing Name: Description: Data type: Number
115.22 3.69 135.98 4.39 119.34 4.75 114.96 6.03	

In the final step we **Create new workfile**.

Text Read - Step 4 of 4		
Import method Create new workfile	Basic structure Unstructure	Data to be Imported
Import options		

Select Finish. And there you have it.



1.8.4 Importing an Excel data file using Proc/Import

Dragging and dropping is the easiest way to create an EViews workfile with data imported from another source. However, there is a longer way where you first open EViews and then use commands for importing data. In this and the next section we describe this process for Excel and text files.

To create an EViews workfile, double click on your EViews icon to open the software, then select **File/New/Workfile**. The following screen will open:

Workfile Create	х	¢
Workfile structure type Dated - regular frequency	Date specification Frequency: Annual	
Irregular Dated and Panel workfiles may be made from Unstructured workfiles by later specifying date and/or other identifier series.	Start date: 1929 End date: 2010	

To create the workfile for annual data covering sample period **1929** to **2010**, select **Annual** from the drop-down menu in **Frequency** and type in the **Start** and **End dates**. Clicking on **OK** will create the **UNTITLED** workfile below.

	orkfil)	e: UNTITI	.ED								- - x
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
		929 201 929 201									Filter: *
B) c M re	esid										

To import data select **Proc/Import/Read**.

	Workfile: UNTITLED View Proc Object Print Save Range: 1929 2010 82 obs Sample: 1929 2010 82 obs C C C resid	
Import	DRI Basic Economics Database	
<u>E</u> xport	• <u>R</u> ead	

EViews will then ask you for the location of the Excel file. Open the *gdpplev.xls* file we have created:

File name:	gdplev	•	Excel (*.xls)	•
		Update default directory	Open 👻	Cancel

and the following screen will open:

Excel Spreadsheet Import	x
Data order By Observation - series in columns By Series - series in rows Names for series or Number & named in file	Excel 5+ sheet name
nom_gdp real_gdp	 Write date/obs EViews date format First calendar day Last calendar day
Import sample I929 2010 Reset sample to: Current sample Workfile range To end of range	Write series names
	OK Cancel

Be sure to pick the **By observation** – series in columns option, enter the correct location of the first observation (**B9**) and type in the names of the variables – in this case NOM_GDP and *REAL_GDP*. Clicking on **OK** will import the data from the Excel datafile to the EViews workfile. As a check, open the group NOM_GDP and *REAL_GDP* and you can see that we have successfully imported the data (do check this against the Excel spreadsheet shown above).

obs	NOM_GDP	REAL_GDP
1929	103.6000	977.0000
1930	91.20000	892.8000
1931	76.50000	834.9000
1932	58.70000	725.8000
1933	56.40000	716.4000
1934	66.00000	794.4000
1935	73.30000	865.0000

The final step is to save your workfile.

w 📰	Workfile: UNTITLED _ 🗆 X										
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
	Range: 1929 2010 82 obs Sample: 1929 2010 82 obs										
Sample. 1929 2010 82 005											
	Untitled / New Page /										

1.8.5 Importing a text data file using Proc/Import

Excel data files are a common way of handling data. However, some data also come in text form and so, for completeness, we shall consider the case of importing a text data file. As an illustration we will import an ASCII file called *food.dat*. Before trying to import the data in *food.dat*, examine the contents of the definition file *food.def*. It is an ASCII file that can be opened with NOTEPAD. The *.*def* files contain variable names and descriptions. For example, open *food.def*.

food.def					
food_exp income					
obs: 40					
1. food_exp (y) weekly food expenditure in \$ 2. income (x) weekly income in \$100					
variable	obs	Mean	Std. Dev.	Min	Мах
food_exp income	40 40	283.5735 19.60475	112.6752 6.847773	109.71 3.69	587.66 33.4

This definition file shows that there are 40 observations on two variables, *FOOD_EXP* and *INCOME*, in that order, and they are weekly food expenditure and weekly income, respectively.

To import this data, create a workfile for 40 undated observations and click **OK**. Select **File/New/Workfile** on the EViews menu.

Workfile Create		х
Workfile structure type Unstructured / Undated Irregular Dated and Panel workfiles may be made from Unstructured workfiles by later specifying date and/or other identifier series.	Data range Observations: 40]

Click Proc/Import/Read as in the previous section, and navigate to the file food.dat.

File name: food.dat	Text-ASCII (*.*)	•
Update default directory	Open 🔻	Cancel

Select **Open**. A dialog box will open. And at the bottom of the dialog box, we can see the first few observations in the data file. Because the data file does not contain variable names, enter them as shown, and click **OK**.

ASCII Text Import	x
Name_for series or Number if named in file Data order food_exp income in Columns Image: Column to the series of t	Rectangular file layout I File laid out as rectangle Columns to skip: 0 Rows to skip: 0
Series headers # of headers (including names) before data: 0 Import sample 1 40 1 40 Current sample Workfile range To end of range	Comment character:
Preview - First 16K of file:	
115.22 3.69 135.98 4.39 119.34 4.75 114.96 6.03 187.05 12.47 243.92 12.98	OK Cancel

Two new series have been added, FOOD_EXP and INCOME. Save your file.

Workfile: UNTITLED									
View Proc Object Print Save Details+/- Show Fetch									
Range: 1 40 40 obs Sample: 1 40 40 obs									
Sample: 1 40 40 obs Sample: 1 40 40 obs food_exp income resid									

1.8.6 Adding data to an existing workfile

If you have an existing workfile containing some data, but you would like to add more data to it, you can use either the drag and drop method or the **Proc/Import** method. The procedures described in the last four sections can be used in a similar way.

1.8.7 Frequency conversions

EViews offers a range of frequencies – annual, quarterly, monthly and so on.

Workfile Create			х
Workfile structure type Dated - regular frequency Irregular Dated and Panel workfiles may be made from Unstructured workfiles by later specifying date and/or other identifier series. Workfile names (optional) WF: Page:	Date specific Frequency: Start date: End date:	Annual Multi-year Annual Semi-annual Quarterly Monthly Bimonthly Bimonthly Fortnight Ten-day (Trimonthly) Weekly Daily - 5 day week Daily - 7 day week Daily - custom week Intraday Integer date	

Examples of data conventions include:

- Annual: specify the year; for example, 1981, or 2007.
- Quarterly: the year, followed by a number or the quarter. Examples: 2007:3, 2007Q3.
- Monthly: the year, followed by a number or the month. Examples: 1956:11, 1956M11.
- Weekly and daily: by default, you should specify these dates as Month/Day/Year. Thus August 15, 2007 is 8/15/2007.

EViews also offers an easy way to convert from one frequency to another. Suppose we are interested in converting the annual data on GDP to their quarterly equivalents. To do so, first click on **New Page** and select **Specify by Frequency/Range**.

View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Del
Range: 1929 2010 82 obs Sample: 1929 2010 82 obs									
[6] c [√] go	ip								
⊠ re ⊠ re		lp		/	 				
🗹 year									
• • •	Gdple	v / New	Pag	1					k
				Sp	ecify by <u>F</u> rec	quency/R	lange .		

Specify the range of the quarterly data as shown.

Workfile Create	x
Workfile structure type Dated - regular frequency	Date specification Frequency: Quarterly
Irregular Dated and Panel workfiles may be made from Unstructured workfiles by later specifying date and/or other identifier series.	Start date: 1929:1 End date: 2010:4
Workfile names (optional) WF: GDPLEV Page: quarterly	

Click **OK**. The following page will open. You might like to name this page too.

7				
EViews - [Workfile: GDPLEV - (c:\	data\eviews\gdpl	ev.wf1)]		_ 🗆 X
🥅 File Edit Object View Pr	roc Quick Opt	ions Add-ir	ns Window	w Help
				_ # X
View Proc Object Print Save De	etails+/- Show	Fetch Store	Delete Gei	nr Sample
Range: 1929Q1 2010Q4 32				Filter: *
Sample: 1929Q1 2010Q4 320	8 obs 🚤			
B c	~			
M resid		< · · · ·		
¥				
Gdplev quarterly New Pag	ge /			
	Path = c:\data\e	eviews DB	= none 🛛 🛛	VF = gdplev

To transfer data from one frequency to another, just **right-click** on the variable on the page with the annual frequency (say *REAL_GDP*) and drag that to the bottom of the page set up for quarterly data. The screen below will open.

Paste Special	Х
Paste real_gdp as Pattern: * Name: real_gdp	Frequency conversion options High to low frequency method Specified in series No conversion of partial periods
Paste as C Series (by Value) C Link	Low to high frequency method Specified in series
Merge by Date with frequency conversion General match merge criteria	Constant-match average Constant-match sum Quadratic-match average Quadratic-match sum Linear-match last

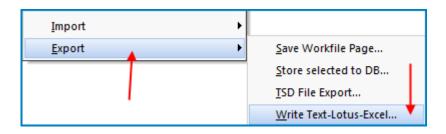
We are converting from a low to a high frequency, and in this example we are selecting the **constant-match sum** option. Clicking **OK** will create the new variable. For comparison, open the two series and you will note that the quarterly data is one-fourth of the annual.

	REAL_GDP						
		Page Link: gd	plev/real_gdp				
1929Q1	244.3						
1929Q2	244.3						
1929Q3	244.3						
1929Q4	244.3						
1930Q1	223.2						
1930Q2	223.2						
1930Q3	223.2						
1930Q4	223.2						
1931Q1	•			•			

1.8.8 Exporting data from EViews

There are times when you would like to export data from an EViews workfile. To illustrate, let us work with *gdplev.wf1* and export the two series. To do so, highlight the two series, then click on **Proc/Export/Write Text-Lotus-Excel.**

View	Proc	Object	Print	Save	Details+/-
		29 201 929 201			
<mark>₿</mark> C					
🗹 ga					
🗹 re		ip			
🗹 re	sid		hi	ghli	aht
M ye	ar			9	gin



This will then open a window with the option to save as a text or Excel file.

File name:	gdp_data	•
Save as type:	Text-ASCII (*.*)	-
Hide Folders	Update default directory Save Cancel	

In the resulting screen you will have some choices concerning formats and delimiters.

ASCII Text Export	x
Data order Text for NA Text for NA NA NA	Excel 5+ sheet name
Series to export	-Export options
real_gdp gdp	 Write date/obs EViews date format First calendar day Last calendar day
Sample to export	Write series names
Reset sample to:	ASCII-Text delimiter: Tab O Space O Comma
	OK Cancel

Keywords

arithmetic operators basic graph close series copying a table copying graph Generate Series Genr graph metafile graph options Group: empty Quick/Generate Series Quick/Graph Quick/Group Statistics Quick/Sample Quick/Series Statistics

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correlation Ctrl+C Ctrl+P Ctrl+V data definition files data export data import data range descriptive statistics drag and drop EViews functions Freeze function reference help histogram import Excel data import Text data math functions multiple graphs Name Object name open group open series path quick help reference Quick/Empty Group Quick/Show sample range sample range: change scalars scatter diagram series series: delete series: rename spreadsheet view vectors workfile: open workfiles

CHAPTER 2

The Simple Linear Regression Model

CHAPTER OUTLINE

- 2.1 Open the Workfile
 - 2.1.1 Examine the data
 - 2.1.2 Checking summary statistics
 - 2.1.3 Saving a group
- 2.2 Plotting the Food Expenditure Data2.2.1 Enhancing the graph2.2.2 Saving the graph in the workfile2.2.3 Copying the graph to a document2.2.4 Saving a workfile
- 2.3 Estimating a Simple Regression2.3.1 Viewing equation representations2.3.2 Computing the income elasticity
- 2.4 Plotting a Simple Regression
- 2.5 Plotting the Least Squares Residuals2.5.1 Using View options2.5.2 Using Resids plot

- 2.5.3 Using Quick/Graph
- 2.5.4 Saving the residuals
- 2.6 Estimating the Variance of the Error Term
- 2.7 Coefficient Standard Errors
- 2.8 Prediction Using EViews 2.8.1 Using direct calculation 2.8.2 Forecasting
- 2.9 Estimating a Nonlinear Relationship
 - 2.9.1 Fitting a quadratic model
 - 2.9.2 Interpreting the quadratic model
 - 2.9.3 Plotting the fitted quadratic model
 - 2.9.4 Estimating a log-linear model
 - 2.9.5 Interpreting the log-linear model
 - 2.9.6 Prediction in the log-linear model
- 2.10 Regression with Indicator Variables

KEYWORDS

In this chapter we introduce the simple linear regression model and estimate a model of weekly food expenditure. We also demonstrate the plotting capabilities of EViews and show how to use the software to calculate the income elasticity of food expenditure, and to predict food expenditure from our regression results.

2.1 OPEN THE WORKFILE

The data for the food expenditure example are contained in the workfile *food.wf1*. Locate this file and open it by selecting **File/Open/EViews Workfile**

EV EV	/iews									
File	Edit	Object	View	Proc	Quick	Options	Add-ins	Window	Help	
	<u>N</u> ew					•				
	<u>O</u> pen					•	<u>E</u> View	s Workfile.		Ctrl+O
1	<u>S</u> ave					Ctrl+S	<u>F</u> oreig	gn Data as l	Workfil	e 😽

<mark>M</mark> Open				×
🕞 🕞 🗸 🕨 🗸 Compute	r → OS (C:) → data → ev	iews	 Search eviews 	<u> </u>
Organize 🔻 New folder) · · · · · · · · · · · · · · · · · · ·
🔆 Favorites	Name A		Date modified	
Desktop	ex9_13		7/2/2010 10:56 AM	EViews Workfile
녫 Downloads 🗐 Recent Places	axrate		8/7/2010 2:34 PM	EViews Workfile
Necent Hotes	📴 fair4		1/14/2010 9:48 AM	EViews Workfile
ز Libraries	🚟 food		2/7/2010 10:16 AM	EViews Workfile
Documents	🔠 fred		1/24/2011 6:23 PM	EViews Workfile
J Music	赶 fullmoon		1/13/2010 8:42 AM	EViews Workfile
Pictures	赶 fultonfish		7/2/2010 8:37 AM	EViews Workfile
🧮 Videos	jascar		11/14/2010 12:24 PM	EViews Workfile
💻 Computer	🔁 gasga		11/14/2010 12:24 PM	EViews Workfile
🚰 OS (C:)	gdp	Click Open	8/7/2010 2:31 PM	EViews Workfile
	🛃 gfc		8/6/2010 8:47 AM	EViews Workfile
📬 Network	gold		8/7/2010 2:35 PM	EViews Workfile
				<u> </u>
File	name: food		EViews Workfile	(*.wf1)
		🔲 Update default dir	ectory Open 🗸	Cancel

The initial workfile contains two variables *INCOME*, which is weekly household income, and *FOOD_EXP*, which is weekly household food expenditure. See the definition file *food.def* for the variable definitions.

	orkfile	e: FOOD	- (c:\da	ta∖evi	ews\food.w	f:	1)					- = x		
View	Proc	Object	Print	Print Save Details+/- Show Fetch Store Delete Genr Sample										
			- 40 obs - 40 obs - observations Filter:*											
Land C Solution for Solution for Solutio	come	kp 🔶		_			serie	5						

2.1.1 Examine the data

Whenever opening a new workfile it is prudent to examine the data. Select *INCOME* by clicking it, and then, while holding, the **Ctrl**-key select *FOOD_EXP*.

Workfile: FOOD - (c:\data\eviews\food.wf1)									
View	Proc	Object	Print	Save	Details+/-	J	Show	Fetch	Store
Range: 1 40 40 obs Sample: 1 40 40 obs									
	od_e: come		•					buble	
M re	sid						C	lick	

Double-click in the blue area and select **Open Group**. The data appear in a spreadsheet format, with *INCOME* first since it was selected first.

G	Gr	oup:	UNTITLED) Wor	kfile: F(DOD::Fo	0	d/					×
V	/iew	Proc	Object	Print	Name	Freeze		Default	•	Sort	Transpose	Edit+/-	Smp
	obs		FOOD_	EXP	IN	ICOME							
	1		11	5.22		3.69							
	2		13	5.98		4.39							
	3		11	9.34		4.75							
	4		11	4.96		6.03							
	5		18	7.05		12.47							

2.1.2 Checking summary statistics

In the definition file *food.def* we find variable definitions and summary statistics.

```
food.def
food exp income
 Obs: 40
 1. food exp (y)
                     weekly food expenditure in $
                       weekly income in $100
 2. income (x)
            Obs
  Variable |
                   Mean Std. Dev.
                                    Min
                                            Max
_____+
             40 283.5735 112.6752
                                          587.66
  food_exp |
                                  109.71
   income | 40 19.60475 6.847773 3.69
                                            33.4
```

To verify that the workfile we are using agrees, select View/Descriptive Stats/Common Sample.

G Group: UNTITLED Workfile: FC	OD::Fo	od\		
View Proc Object Print Name	Freeze	Default	•	Sor
Group Members	COME			
	3.69			
Spreadsheet	4.39		1	
Dated Data Table	4.75			
Graph	6.03			
Graphin	12.47			
Descriptive Stats	<u>C</u>	ommon Sai	mple	

The resulting summary statistics agree with the information in the *food.def*, which assures us that we have the correct data.

Group: UNTITL	ED Wor	kfile: F	OOD::Fo	od∖		_ 0	⊐ X
View Proc Object	Print	Name	Freeze	Sample	Sheet	Stats	Spec
	FOOD	_EXP	INC	OME			
Mean	283.	5735	19.6	0475			
Median	264.4	4800	20.0	3000			
Maximum	587.6	6600	33.4	0000			
Minimum	109.1	7100	3.69	0000			
Std. Dev.	112.0	6752	6.84	7773			
Skewness	0.492	2083	-0.62	26507			
Kurtosis	2.85	1522	3.27	9728			
Jarque-Bera	1.651	1045	2.74	7156			
Probability	0.438	3006	0.25	3199			
Sum	1134	2.94	784	.1900			
Sum Sq. Dev.	4951	32.2	182	8.788			
Observations	4	0	4	40			
							•
	•						• //

To return to the spreadsheet view, select View/Spreadsheet.

G Group: U	NTITLE	D Wor	kfile: F(OOD::Fo	od∖		_ 0	= x	<u>G</u> roup Members	
View Proc C	bject	Print	Name	Freeze	Sample	Sheet	Stats	Spec	<u>S</u> preadsheet	
		FOOD	_EXP	INC	ÒME 🛛		۵ <u>ــــــــــــــــــــــــــــــــــــ</u>		<u>D</u> ated Data Table	\mathbf{i}
Mean		283.5	5735	19.6	0475				Graph	· · ·
Median		264.4	4800	20.0	3000				<u>o</u> mp	

2.1.3 Saving a group

It is often useful to save a particular group of variables that are in a spreadsheet. From within the Group screen, select **Name** and then assign an **Object Name**. Click **OK**.

Group: UNTITLE	ED Workfile: FO)OD::Food\ _ 🗖 🗙
View Proc Object		Freeze) Sample Sheet Stats Spec
	FOOD	INCOME
Mean	283 6735	19.60475
Median	264.4800	Object Name X
Maximum	587.6600	
Minimum	109.7100	-Name to identify object
Std. Dev.	112.6752	24 characters maximum, 16 food_data
Skewness	0.492083	- Virial or fewer recommended
Kurtosis	2.851522	
		Display name for labeling tables and graphs (optional)
Jarque-Bera	1.651045	
Probability	0.438006	
Sum	11342.94	OK Cancel
Sum Sq. Dev.	495132.2	
Observations	40	40
	•	

Close the spreadsheet by clicking the upper-right-hand corner.

		_				::Food\			clo	 		x
View	Proc	Object	Print	Name	Freeze	Sample	Sheet	Stats	Spec			

The new object in the workfile is a Group named FOOD_DATA.

Workfile: FOOD - (c:\data\eviews\food.wf1) _ = = ×						×		
View Proc Object Prin	t Save [Details+/-	Show	Fetch	Store	Delete	Genr	Sam
Range: 1 40 40 ob Sample: 1 40 40 ob							Filt	er: *
C G food_data food_exp food_exp income resid Food & New Page			sa	ved	grou	p		

2.2 PLOTTING THE FOOD EXPENDITURE DATA

With any software there are several ways to accomplish the same task. We will make use of EViews "drop-down menus" until the basic commands become familiar. Click on **Quick/Graph**

<u>S</u> am;	ole
Gene	erate Series
S <u>h</u> ov	v
G <u>r</u> ap	h 🗡

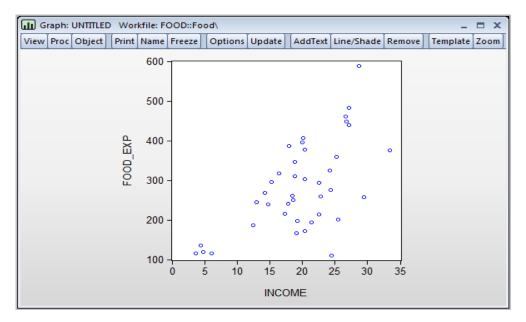
In the dialog box type the names of the variables with the x-axis variable coming first!

Series List	х
List of series, groups, and/or series expressions—	
income food_exp	~
OK Cancel	

In the Graph Options box select Scatter from among the Basic graphs.

Graph type
General:
Basic graph 🖌 🖌
Specific:
Line & Symbol
Bar
Spike
Area
Area Band Mixed with Lines
Dot Plot
Error Bar
High-Low (Open-Close)
Scatter
XY Line
XY Area
Pie
Distribution
Quantile - Quantile
Boxplot
[]

A plot appears, to which we can add labels and a title.



2.2.1 Enhancing the graph

While the basic graph is fine, for a written paper or report it can be improved by

- adding a title
- changing the scale on the vertical axis

These tasks are easily accomplished. To add a title, click on **AddText** on the Graph menu.

Graph: UNTITLED Workfile: FOOD::Food	×]
View Proc Object Print Name Freeze Options Update	AddText Line/Shade Remove Template Zoom

In the resulting dialog box you will be able to add a title, specify the location of the title, and use some stylistic features.

Text Labels		x
Food Expenditur	e Data	
options	figure	title
Justification C Left C Right © Center	Position Top Bottom Left - Rotated Right - Rotated	Text box Text in Box Box fill color:
Font	C User: X 0.00 Y 0.00	Frame color:
	OK	ncel

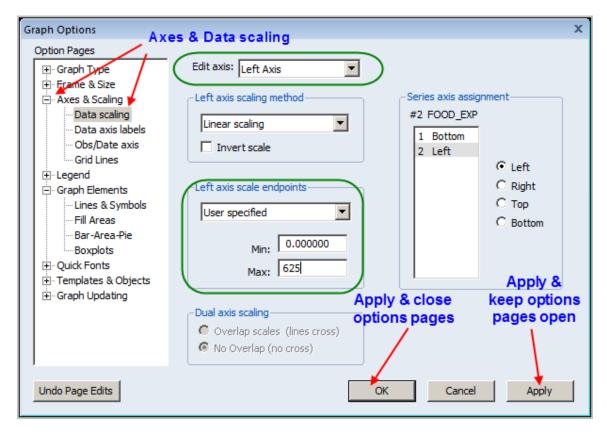
To center the title at the top, click the appropriate options and type in the title. Click **OK**.

To alter the vertical axis so that it begins at zero, click on **Options** on the Graph Menu.

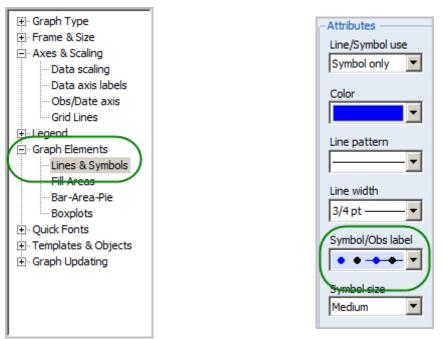
Graph: UNTITLED Workfile: FOOD::Food												
View	Proc	Object	Print	Name	Freeze	Options	pdate	AddText	Line/Shade	Remove	Template	Zoom

Alternatively, **double-click** inside the graph itself. Click on the **Axes/Scale** option, select the **Left Axis** from the pull-down **Edit axis** menu. Choose **User specified** in the **Left axis scale method**.

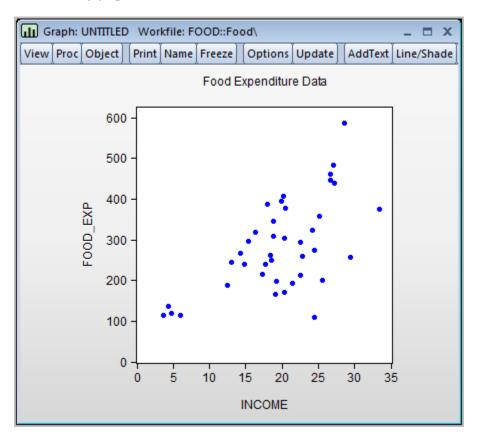
Enter 0 and 625 as the **Min** and **Max** values. Click **OK** to **return** to the graph. To make further changes, click **Apply**.



To change the "empty circles" used in the graph to "filled circles", choose **Graph Elements**/ **Lines & Symbols**. In the **Attributes** panel choose **Symbol/Obs label** and from the pull-down menu select the solid-looking circles. Note that other attributes can be changed as well.



Click **OK**. The resulting graph is now



Explore the other **Graph Options** to see all the features.

2.2.2 Saving the graph in the workfile

To save the graph so that it remains in the workfile, click on **Name**, then enter a name. Note that separate words are not allowed, but separating words with an underscore is an alternative.

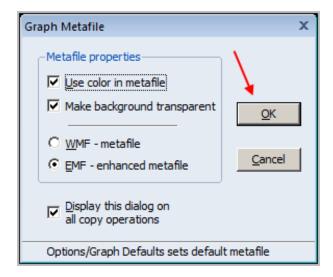
Graph: FOOD_SCATT	ER Workfile: FOOD::Food\	- = ×
View Proc Object Pri	int Name Freeze Options Update AddText Line/S	Shade Remo
Save graph in 600 workfile	Object Name Object Name food_scatter Object	

In the workfile, you will find an icon representing the graph just created:

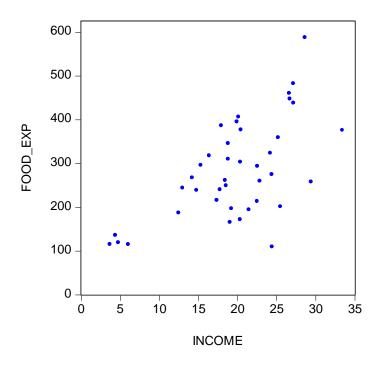
Workfile: FOOD - (c:\data\eviews\food.wf1) _ 🗖 🗙								
View Proc Object Print Save Details+/-	Show Fetch Store Delete							
Range: 140 40 obs Sample: 140 40 obs	Filter: *							
I M Income	d graph. e icon.							

2.2.3 Copying the graph to a document

As is usual with Windows-based applications, we can copy by clicking somewhere inside the graph, to select it, then **Ctrl+C**. Or in the main window, click on **Edit/Copy**



The dialog box that shows up allows you to choose the file format. Switch to your word processor and simply paste the graph (**Ctrl+V**) into the document, as we have done below.



Food Expenditure Data

To save the graph to a disk, select the **Object** button on the Graph menu.

Graph: EOOD_SCATTER Workfile: FOOD::Food\							
View Froc Object Plint Name Freeze Options Update							
Food Expenditure Data							

Select **View Options/Save graph to disk**. In the resulting dialog box you have several file types to choose from, and you can select a name for the graph image.

<u>S</u> tore to DB	C <u>o</u> py to clipboard
Update from DB	<u>O</u> ptions
<u>C</u> opy Object	Add <u>t</u> ext
<u>N</u> ame F2	Add lines & shading
<u>D</u> elete	T <u>e</u> mplates
Freeze <u>O</u> utput	<u>S</u> ort
Print Ctrl+P	<u>R</u> emove selected
View Options	Save graph to disk

2.2.4 Saving a workfile

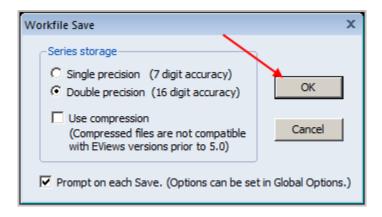
You may wish to save your workfile at this point. If you select the **Save** button on the workfile menu, the workfile will be saved under its current name *food.wf1*. It might be better to save this file under a new name, so that the original workfile remains untouched. Select **File/Save As** on the EViews menu.

EView:	s				
File Ed	it Obje	ct View	Proc	Quick	Options
New					•
<u>O</u> pe	n	-			•
<u>S</u> ave		/			Ctrl+S
Save	e <u>A</u> s 🖊				

Select a simple but informative name.

File name:	food_chap02)			•
Save as type:	EViews Workfile (*.wf1)				-
Hide Folders		Update default directory	Save	Cancel	

EViews will ask the precision. Choose the default.



We have named it *food_chap02.wf1*. Once saved with a name, it can be re-saved using Ctrl+S, or by selecting File/Save.

2.3 ESTIMATING A SIMPLE REGRESSION

To obtain the least squares parameter estimates for the food expenditure equation, we select **Quick/Estimate Equation** from the EViews menu.

EViews					
File Edit Object Vi	ew Proc	Quick	Options	Add-ins	Wind
F		<u>S</u> ar	mple		
For		<u>G</u> e	nerate Seri	es	
regression		S <u>h</u>	ow		
		G <u>r</u> a	aph		
View Proc Object P	HARO2 - (c:\ rint Save	E <u>m</u>	pty Group	(Edit Serie	s)
Range: 1 40 40		Sei	<u>i</u> es Statisti	cs	•
Sample: 1 40 40	obs	Gr	ou <u>p</u> Statist	ics	•
B c		👗 <u>E</u> st	imate Equ	ation	

In the **Equation Specification** dialog box, type the dependent variable $FOOD_EXP$ (the y variable) first, C (which is EViews notation for the intercept term, or constant), and then the independent variable *INCOME* (the x variable). Note that in the **Estimation settings** window, the **Method** is **Least Squares** and the **Sample** is **1 40**. Click **OK**.

Equation Estimation	x
Specification Options	
Equation specification	
Dependent variable followed by list of regressors including ARMA and PDL terms, OR an explicit equation like Y=c(1)+c(2)*X.	
food_exp c income	
dependent variable first, then "c" for intercept (constant term), then the explanatory variable	
Estimation settings Method: LS - Least Squares (NLS and ARMA)	
Sample: 1 40	
To estimate	
OK Cancel	

The estimated regression output appears. EViews produces an equation object in its default **Stats** view. We can name the equation object to save it permanently in our workfile by clicking on **Name** in the equation's toolbar. We have named this equation **FOOD_EQ**.

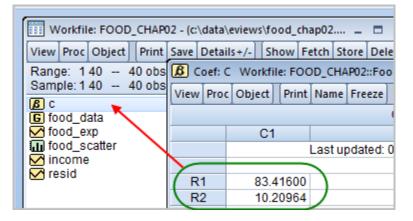
Equation: UNTITLED Workfile: FOOD_CHAP02::Food\ _ 🗖 🗙										x
View Proc Obje	ct][Print	Name	Freeze	Estimate	Forecast	Stats	Resids			
Dependent Vari Method: Least S Date: 04/19/11 Sample: 1 40 Included obser	quares Time: 0	9:58	R	click t	o name	e eqi	uatior	ı		

The top portion of the regression output is

Dependent Variable: FOOD_EXP Method: Least Squares Date: 04/19/11 Time: 09:58 Sample: 1 40 Included observations: 40										
Variable	Coefficient	Std. Error	t-Statistic	Prob.						
C INCOME	83.41600 10.20964	43.41016 2.093264	1.921578 4.877381	0.0622 0.0000						

Note that the estimated coefficient $b_1 = 83.41600$, the intercept in our food expenditure model, is recorded as the coefficient on the variable C. C is the EViews term for the constant in a regression model. We cannot name any of our variables C since this term is reserved exclusively for the constant or "intercept" in a regression model. In addition to $b_1 = 83.41600$, the EViews output shows that the estimated value of the slope coefficient on the variable weekly income (X) is $b_2 = 10.20964$, as reported in *POE4*, Chapter 2.3.2. The interpretation of b_2 is: for every \$100 increase in weekly income we estimate that there is about a \$10.21 increase in weekly food expenditure, holding all other factors constant.

In the workfile window, double-click on the vector object **C**. It always contains the estimated coefficients from the most recent regression.



The series *RESID* always contains the least squares residuals from the most recent regression. We will return to this shortly.

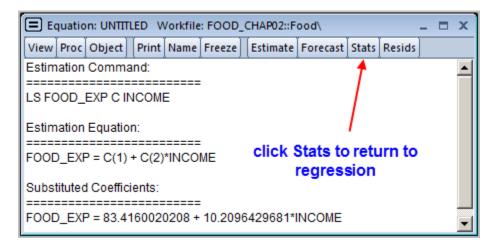
2.3.1 Viewing equation representations

One EViews button that we will use often is the **View/Representations** button in a regression window:

Equation: UNTITLED Workfil	le: FOOD_	CHAP02::Food	١	_ □	x			
View Proc Object Print Name	e Freeze	Estimate For	ecast Stats Re	sids				
Representations								
Estimation Output			aion winde		-			
<u>A</u> ctual, Fitted, Residual	+	In regression window, click View						
ARMA Structure								
<u>G</u> radients and Derivatives	▶ ent	Std. Error	t-Statistic	Prob.				
Co <u>v</u> ariance Matrix	500	43.41016	1.921578	0.0622				
<u>C</u> oefficient Diagnostics	▶)64	2.093264	4.877381	0.0000	-			

The resulting display shows three things:

- The **Estimation Command** is what can be typed into the Command window to obtain the equation results.
- The **Estimation Equation** shows the coefficients and how they are linked to the variables on the equation's right side: C(1) is the intercept and C(2) is the slope.
- The **Substituted Coefficients** displays the fitted regression line.



To return to the regression window click Stats.

2.3.2 Computing the income elasticity

As shown in equation (2.9) of POE4, the income elasticity is defined to be

$$\varepsilon = \frac{\Delta E(y) / E(y)}{\Delta x / x} = \frac{\Delta E(y)}{\Delta x} \cdot \frac{x}{E(y)} = \beta_2 \cdot \frac{x}{E(y)}$$

which is then implemented by replacing unknowns by estimated quantities,

$$\hat{\varepsilon} = b_2 \cdot \frac{\overline{x}}{\overline{y}} = 10.21 \times \frac{19.60}{283.57} = 0.71$$

We can use EViews as a "calculator" by simply typing into the Command window

EViews										
File	File Edit O		View	Proc	Quick					
scala	scalar elast1 = 10.21*19.60/283.57									

then pressing **Enter**. The word **scalar** means that the result is a single number. An icon appears in the workfile. Double-click in the shaded area:

Workfile: FOOD_CHAP02	2 - (c:\data\eviews\food_chap02 💶 🗙 }
View Proc Object Print 9 Range: 140 40 obs Sample: 140 40 obs	Scalar: ELAST1 Workfile: FOOD_CHAP02:: View Proc Object Print Name Freeze E
B c # elast1 ←	0.7057022957294496
G food_data ☑ food_exp	ELAST1 0.705702

While this gives the answer, there is something to be said for using the power of EViews to simplify the calculations. EViews saves the estimates from the <u>most recent regression</u> in the workfile. They are obtained by double clicking the " β " icon:

Workfile: FOOD_CHAP02 -									
View	Proc	Object		Print	Saı				
		40 40							
₿c #el	ast1		_						

These coefficients can be accessed from the array **@coefs**. Also, EViews has functions to compute many quantities. The arithmetic mean is computed using the function **@mean**. Thus the elasticity can also be obtained by entering into the Command window

scalar elast2 = @coefs(2)*@mean(income)/@mean(food_exp)

The result is slightly different from the first computation because in the first we used "rounded-off" values of the sample means.

Ħ Sca	🗱 Scalar: ELAST2 Workfile: FOOD_CHAP02::Food\ 💶 🗖 🗙										
View	Proc	Object	Print	Name	Freeze	Edit	+/-]				
0.7058	0.7058399250255797										
	Value										
ELA	ST2	0.70	5840								
									-		

Because the array **@coefs** is not permanent, you may want to save the slope estimate as a separate quantity by entering the commands

```
scalar b2 = @coefs(2)
scalar elast3 = b2*@mean(income)/@mean(food_exp)
```

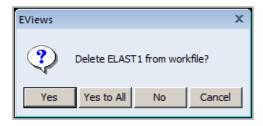
However, the coefficient array can always be retrieved <u>if</u> the food equation has been saved and named. Recall that we did save it with the name **FOOD_EQ**. By saving the equation we also save the coefficients, which can be retrieved from the array **FOOD_EQ.@coefs**.

scalar elas = food_eq.@coefs(2)*@mean(income)/@mean(food_exp)

We have some surplus icons in our workfile now. Keep **B2** and **ELAS**. To clean out the other elasticties, highlight (hold down **Ctrl** and click each), right-click in the blue area, and select **Delete**.

	<u>O</u> pen
Workfile: FOOD_CHAP02 - (c:\data\eviews\food_chap02 🗖 🗙	Copy Ctrl+C
View Proc Object Print Save Details+/- Show Fetch Store Delete	Paste Ctrl+V
Range: 140 40 obs Filter:* Sample: 140 40 obs	<u>P</u> aste Special
₩ b2 M food_exp	Manage Links & Formulae
🔏 c 🖬 food_scatter	<u>F</u> etch from DB
🗰 elas 🗹 income	Update from DB
🗰 elast1 🔽 resid	opuate from Db
elast2 Ctrl+click to Ctrl+click to	<u>S</u> tore to DB
G food_data highlight, then	Object <u>c</u> opy
food_eq right click	Export to file
•• Food / New Page /	
	<u>R</u> ename F2
	<u>D</u> elete

EViews will check to see if you are sure.



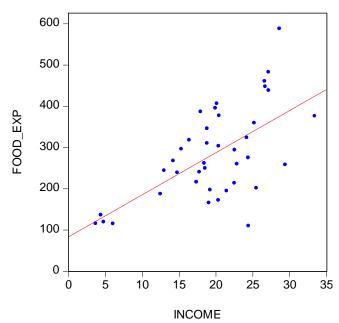
Choose Yes to All to delete all three objects from the workfile. Save the workfile, Ctrl+S.

2.4 PLOTTING A SIMPLE REGRESSION

Select **Quick/Graph** from the EViews menu and repeat the steps in Section 2.2 to create the scatter diagram. We will add the fitted least squares line to the graph. In the **Details** section, using the **Fit lines** drop-down menu, select **Regression Line**.

-Details	
Graph data:	Raw data 💌
Fit lines:	Regression Line 🔽 Options
Axis borders:	None

Click inside the graph, enter Ctrl+C, OK, and then paste into a document using Ctrl+V. The graph should look like this:



Food Expenditure vs. Income

Return to EViews and in the Graph window select the **Name** button and assign a name to this object, such as **FITTED_LINE**.

2.5 PLOTTING THE LEAST SQUARES RESIDUALS

The least squares residuals are defined as

$$\hat{e}_i = y_i - \hat{y}_i = y_i - b_1 - b_2 x_i$$

As you will discover, these residuals are important for many purposes. To view the residuals, open the saved regression results in **FOOD_EQ** by double-clicking the icon.

2.5.1 Using View options

Within the equation **FOOD_EQ** window, click on **View** then **Actual, Fitted, Residual**. There you can select to view a table or several graphs.

Equation: FOOD_EQ Workfile: F	FOOD_CHAP02::Food\ _ 🗖 🗙
View Proc Object Print Name Fr	eeze Estimate Forecast Stats Resids
Representations	<u>`</u>
Estimation Output	L
Actual, Fitted, Residual	Actual, Fitted, Residual Table
<u>A</u> RMA Structure	Actual, Fitted, Residual <u>G</u> raph
<u>G</u> radients and Derivatives	Residual Graph rob.
Co <u>v</u> ariance Matrix	Standardized Residual Graph
<u>C</u> oefficient Diagnostics	64 2.093264 4.877381 0.0000

If you select **Actual, Fitted, Residual Table** you will see the values of the dependent variable y, the predicted (fitted) value of y, given by $\hat{y} = b_1 + b_2 x$, and the least squares residuals, along with a plot.

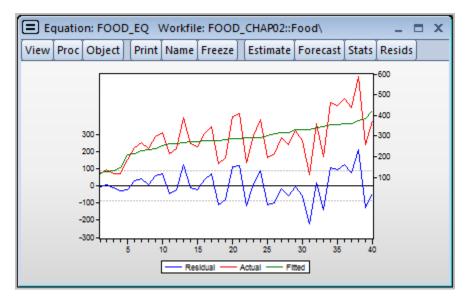
E	Equation: FOOD_EQ Workfile: FOOD_CHAP02::Food\ _ = = ×										
View	Proc	Object	Print	Name	Freeze		Estimate	Forecast	Stats	Resids	
obs	;	Actual	Fit	ted	Residu	ıa	1	Resid	dual P	lot	
1		115.220	121	.090	-5.869	58	3	I	9	I.	
2		135.980	128	3.236	7.743	67	7	I.	Þ	I.	
3		119.340	131	.912	-12.57	18	3	I.	ø	I.	
4		114.960	144	.980	-30.02	01	1	1 0		I.	
5		187.050	210	0.730	-23.68	02	2	i		1	
6						_					▶ //

2.5.2 Using Resids plot

Within the object **FOOD_EQ** you can navigate by selecting buttons. Select **Resids**.

Equation: FOOD_EQ	Workfile: FOOD	_CHAP02::F	-ood/		_ 0	⊐ ×]		
View Proc Object Print	Name Freeze	Estimate	Forecast	Stats	Resids			
Dependent Variable: FC Method: Least Squares Date: 04/19/11 Time: 0 Sample: 1 40 Included observations: 4	residual plot							
Variable	Std. Error t-Statistic			ic F	rot			
C INCOME					.06.			

The result is a plot showing the least squares residuals (lower graph) along with the actual data (*FOOD_EXP*) and the fitted values. When using this plot, note that the horizontal axis is the **observation number** and not *INCOME*. In this workfile the data happen to be sorted by income, but note that the fitted values are not a straight line. When examining residual plots, a **lack of pattern** is consistent with the assumptions of the simple regression model.

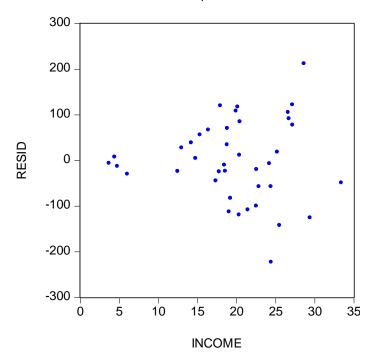


2.5.3 Using Quick/Graph

To create a graph of the residuals against income we can use the fact the EViews saves the residuals from the most recent regression in the series labeled *RESID*. Click on **Quick/Graph**. In the dialog box enter *INCOME* (*x*-axis comes first) and *RESID*.

Series List	×
List of series, groups, and/or series expressions—	
income resid	-
	T
OK Cancel	

Choose the **Scatter** plot. Edit the resulting plot to add title and change symbols if desired. The resulting plot shows how the residuals relate to the values of income.



Residual plot vs. Income

Save this plot by selecting Name and assigning RESIDUAL_PLOT.

2.5.4 Saving the residuals

To save these residuals for later use, we must **Generate** a new variable (series). In the workfile screen click **Genr** on the menu.

					\data\eview	-			,		- 0
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
		40 - 4						-	-	*	Filt

In the resulting dialog box create a new variable called *EHAT* that contains the residuals:

Generate Series by Equation	x
_ Enter equation	
ehat = resid	

Click **OK**. Alternatively, simply type into the Command window

series ehat = resid

2.6 ESTIMATING THE VARIANCE OF THE ERROR TERM

The estimator for σ^2 , the variance of the error term, is

$$\hat{\sigma}^2 = \frac{\sum \hat{e}_t^2}{N-2} = \frac{\text{Sum squared resid}}{N-2}$$

where **Sum squared resid** is the EViews name for the sum of squared residuals. The square root of the estimated error variance is called the **Standard Error of the Regression** by EViews,

S.E. of regression =
$$\hat{\sigma} = \sqrt{\frac{\sum \hat{e}_t^2}{N-2}} = \sqrt{\hat{\sigma}^2}$$

Open the regression equation we have saved as **FOOD_EQ**. Below the estimation results you will find the Standard Error of the Regression and the sum of squared least squares residuals.

S.E. of regression	89.51700
Sum squared resid	304505.2

Also reported are the sample mean of the *y* values (**Mean dependent variable**):

Mean dependent var =
$$\overline{y} = \sum y/N$$

The sample standard deviation of the *y* values (**S.D. dependent var**) is

S.D. dependent var =
$$s_y = \sqrt{\frac{\sum (y_i - \overline{y})^2}{N-1}}$$

These are

Mean dependent var	283.5735
S.D. dependent var	112.6752

2.7 COEFFICIENT STANDARD ERRORS

The estimated error variance is used to construct the estimates of the variances and covariances of the least squares estimators as shown in *POE* equations (2.20)-(2.22). These estimated variances can be viewed from the **FOOD_EQ** regression by clicking on **View/Covariance Matrix**:

	Representations	
	Estimation Output	
	Actual, Fitted, Residual	→
	ARMA Structure	
	Gradients and Derivatives	►
	Co <u>v</u> ariance Matrix	
_	<u>C</u> oefficient Diagnostics	•

The elements are arrayed as

$$egin{bmatrix} \mathrm{var}(b_1) & \mathrm{cov}(b_1,b_2) \ \mathrm{cov}(b_1,b_2) & \mathrm{var}(b_2) \end{bmatrix}$$

In EViews they appear as

Coefficient Covariance Matrix							
	С	INCOME					
С	1884.442	-85.90316					
INCOME	-85.90316	4.381752					

The highlighted value is the estimated variance of b_2 . If we take the square roots of the estimated variances, we obtain the standard errors of the estimates. In the regression output these standard errors are denoted **Std. Error** and are found right next to the estimated coefficients.

Variable	Coefficient	Std. Error
C	83.41600	43.41016
INCOME	10.20964	2.093264

2.8 PREDICTION USING EVIEWS

There are several ways to create forecasts in EViews; we will illustrate two of them.

2.8.1 Using direct calculation

Open the food equation **FOOD_EQ**. Click on **View/Representations**. Select the text of the equation listed under **Substituted Coefficients**. We can choose **Edit/Copy** from the EViews menu bar, or we can simply use the keyboard shortcut **Ctrl+C** to copy the equation representation to the clipboard. Finally, we can paste the equation into the Command window.

	EVi	ews								
			-		Proc	Quick	Options	Add-ins	Window	Help
			ecccia 3 = b2*@	-	(incom	ne)/@me	an(food_e	exp)		
							(income)/		ood_exp)	
			= resid		00.4	0.0000	00004*151	00115		
FU	UUD	_EXP	= 83.410	500202	208 + 1	0.20964	29681*IN	COME		
		Workfi	ile: FOOD	CHAP	02 - (c	data\evi	ews\food_	chap02.wf	1)	
In	Ξ	Equa	tion: FO	OD EO	Work	file: FOO	D_CHAP02	::Food\		_
14	_	, r	oc Obje	10			1	ř	t Stats Re	cide
	<u> </u>	Å	on Com		it į Ivali	- \			1 1	siusj
	==	=====				== \	Step 2:		with	
	LS	FOOI	D_EXP (ME		C	trl+V		
	Fe	timati	on Equa	tion.						
	==	=====	======	=====		==				
	FC	DOD_E	EXP = C(1) + C(2)*INC	OME		Step 1	: highlig	tht
	S	ihstitu	ted Coef	fficients			/		trl+C	, ,
	00				· ·					
	==					==				

To obtain the predicted food expenditure for a household with weekly income of \$2000, edit the Command window to read

scalar FOOD_EXP_HAT = 83.4160020208 + 10.2096429681*20

Press Enter. The resulting scalar value, both formatted and unformatted, is

EXP_HAT					Workfile: FOOD_CHAP02::Food\						
	View	Proc	Object	Pri	int	Name	Freeze		Edit+/-		
	287.6088613828										
			Va	Value							
	FOOD)_EX.	. 287.	287.6089							

2.8.2 Forecasting

A more general, and flexible, procedure uses the power of EViews. In order to predict we must enter additional x observations at which we want predictions. In the main workfile window, double-click **Range**.

Range: 140	 40 obs
Sample: 1 40	 40 obs

This workfile has an Unstructured/Undated structure. Change the number of observations to 43.

Workfile Structure			х
Workfile structure type Unstructured / Undated edit num	• ber of	Observations: 43	

Click **OK**. EViews will check with you to confirm your action.

EViews	
?	Resize involves inserting 3 observations. Continue ?
	Yes No

The **Sample** and **Range** will now be 43.

Range: 1 43 -- 43 obs Sample: 1 43 -- 43 obs

Next, double-click on *INCOME* in the main workfile to open the series, and click the **Edit**+/button in the series window, which puts EViews in edit mode.

🖂 Serie	es: INCOME Wor	rkfile: FOOD_CHAP02::Food\
View	roc Object Prope	erties Print Name Freeze Default 🔽 Sort Edit+/- Smpl+/-
3.69		INCOME
		Last updated: 04/19/11 - 12:55
		weekly household income
1	3.69	
2	4.39	click Edit +/- to begin editing
3	4.75	
4	•	

Scroll to the bottom and you see NA in the cells for observations 41-43. Click the cell for observation 41 and enter 20. Enter 25 and 30 in cells 42 and 43, respectively. When you are done, click the **Edit**+/- button again to turn off the edit mode.

Serie:	Series: INCOME Workfile: FOOD_CHAP02::Food\ _ 🗖 🗙								
View	View Proc Object Properties Print Name Freeze Default Sort Edit+/- SmpI+/-								
30									
39	29.40			/	▲				
40	33.40		click Edit +/						
41	20.00		editi	ng					
42	25.00								
43	30.00	new ob	servations						
					-				
	•				▶ <i> </i> .				

Now we have three extra *INCOME* observations that do not have *FOOD_EXP* observations. When we do a regression EViews will toss out the missing observations, but it will use the extra *INCOME* values when creating a forecast.

To forecast, first re-estimate the model with the original data. (This step is not actually necessary, but we want to illustrate a point.) Click on **Quick/Estimate Equation**. Enter the equation. Note in the dialog box that the **Sample** is 1 to 43.

 Equation specification Dependent variable followed by list of regressors including ARMA and PDL terms, OR an explicit equation like Y=c(1)+c(2)*X. 	
food_exp c income	
Estimation settings	
Method: LS - Least Squares (NLS and ARMA)	~
Sample: 143	×

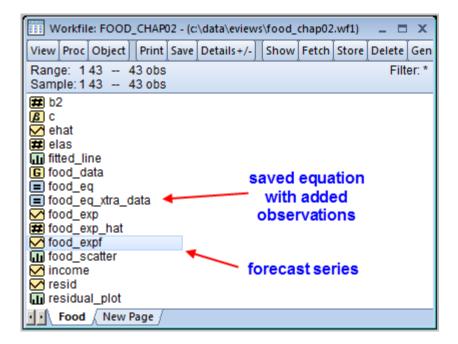
The estimation results are the same, and EViews tells us that the **Included observations** are 40 **after adjustments**. The three observations with no values for *FOOD_EXP* were discarded. To forecast with the estimated model, click on the **Forecast** button in the equation window.

Equation: UNTITLED Workfile: FOOD_CHAP02::Food\								
View Proc Object Print Name Free	e][Estimate]Forec	ast Stats	Resids					
Dependent Variable: FOOD_EXP Method: Least Squares Date: 04/19/11 Time: 13:01 Sample (adjusted): 1 40 Included observations: 40 after adju		orecas	tbutt	on				

The **Forecast** dialog box appears. EViews automatically assigns the name **FOOD_EXPF** to the forecast series, so if you want a different name enter it. The **Forecast sample** is 1 to 43. Predictions will be constructed for the 40 samples values and for the 3 new values of *INCOME*. For now, ignore the other options. Click **OK**.

Forecast	х
Forecast of Equation: UNTITLED Se Series names Forecast name: food_expf S.E. (optional):	eries: FOOD_EXP name series Method Static forecast (no dynamics in equation)
GARCH(optional):	 Structural (ignore ARMA) Coef uncertainty in S.E. calc
Forecast sample	Output Forecast graph Forecast evaluation
✓ Insert actuals for out-of-sample obse OK	Cancel

A graph appears showing the fitted line for observations 41-43 along with lines labeled ± 2 S.E. We will discuss these later. To see the fitted values themselves, in the workfile window, double-click on the series named *FOOD_EXPF* and scroll to the bottom.



The three forecast values corresponding to incomes 20, 25 and 30 are in cells 41, 42 and 43. The value in cell 41 is 287.6089, which is the same predicted value obtained earlier in Chapter 2.3.3b.

While this approach is somewhat more laborious, by using it we can generate forecasts for many observations at once. More importantly, using EViews to forecast will make other options available to us that simple calculations will not.

2.9 ESTIMATING A NONLINEAR RELATIONSHIP

Consider a model from real estate economics in which the price (*PRICE*) of a house is related to the house size measured in square feet (*SQFT*). Open the EViews workfile *br.wf1*. Save it with a new name, such as *br_chap02.wf1*.

2.9.1 Fitting a quadratic model

A quadratic model for house prices includes the squared value of SQFT, giving

$$PRICE = \alpha_1 + \alpha_2 SQFT^2 + e$$

This is a simple regression model $y = \alpha_1 + \alpha_2 x + e$, with y = PRICE and $x = SQRT^2$. Models with transformed variables are easily estimated in EViews using variable transformations inserted directly in the equation specification. Select **Quick/Estimate Equation** from the EViews menu. In the dialog box enter the equation using $SQFT^2$ to represent the quadratic term.

-Equa	tion specification	
	Dependent variable followed by list of regressors including ARMA and PDL terms, OR an explicit equation like $Y=c(1)+c(2)*X$.	
pric	e c sqft^2	_
		T

The resulting estimates are:

Sample: 1 1080 Included observations: 1080								
Variable	Coefficient	Std. Error	t-Statistic	Prob.				
C SQFT^2	55776.57 0.015421	2890.441 0.000313	19.29690 49.25420	0.0000 0.0000				

It is useful now to begin doing the least squares estimation using the Command window approach. The quadratic model estimated above can also be implemented by entering into the Command window

Is price c sqft^2

Alternatively, the equation can be estimated and named **QUADRATIC** with one command using

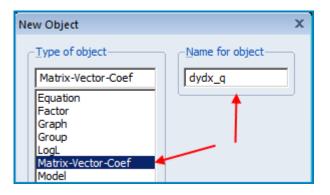
equation quadratic.ls price c sqft^2

2.9.2 Interpreting the quadratic model

EViews can compute the slope and elasticity at any point using the same approach as in Section 2.3.2. The slope of the fitted line is also known as the **marginal effect** in economics. It is given by

$$\frac{d(PRICE)}{dSQFT} = 2\hat{\alpha}_2 SQFT$$

where $\hat{\alpha}_2 = 0.015421$ is the least squares estimate of the parameter α_2 that is attached to the variable **SQFT^2** from the regression output. To compute this value we can choose a particular house size, say SQFT = 2000. This scalar can be calculated within EViews using the saved coefficients @coefs, following estimation of the regression equation. So that we can create a few predicted values, first create a new **Object**. From the EViews menu choose **Object/New Object**. In the **New Object** dialog box, choose **Matrix-Vector-Coef** and assign a name: dydx_q is representative for the slope of the quadratic model.



We will compute marginal effects for three house sizes, 2000, 4000, and 6000 square feet. So choose a vector with three rows and one column.

New Matrix	x
Type O Matrix O Symmetric Matrix Image: Vector Image: O Coefficient Vector	Dimension Rows: 3 Columns: 1
ОК	Cancel

Click OK to open the Vector. In the Command window enter, one after the other,

```
dydx_q(1) = 2*@coefs(2)*2000
dydx_q(2) = 2*@coefs(2)*4000
dydx_q(3) = 2*@coefs(2)*6000
```

Note that Command window entries are simple text, and can be copied and pasted, or edited directly to produce new commands. That is, after typing the first command, highlight it, then copy and paste it into a new Command window below the previous. Or, even more simply, edit the first command by replacing (1) with (2) and 2000 with 4000, then press **Enter**. The resulting vector is now

🔲 Ve	[Vector: DYDX_Q Workfile: BR_CHAP02::Br\ 🗕 🗖 🗙									
View	Proc	Object	Print	Name	Freeze	Edit+/-	Label+/	/-][[
	DYDX_Q									
		C1								
		L	ast up	dated:	04/20/1	1 - 09:06				
R1	1	61.6	8521							
R2	2	123.	3704							
R3	3	185.	0556					-		
		•					•	ſ //		

While those are the answers, it is nice to "dress them up" a bit. In the Vector, highlight the numbers and copy using Ctrl + C.

🔝 Ve	[Vector: DYDX_Q Workfile: BR_CHAP02::Br\ 🗕 🗖 🗙								
View	Proc	Object	Print	Name	Freeze	E	Edit+/-	Label	+/-][
	DYDX_Q								
		C1							
		L	ast up	dated:	04/20/1	1-	09:06		
R1	1	61.6	8521						
R2	2	123	.3704						
R	3	185	.0556						-
		•							<u>۱</u>

Select the formatted option, then paste the table into word processing software. Edit the table to make it presentable.

Marginal Effect of an Additional Square Foot of Living Space						
Square feet Predicted change in price						
2000	61.68521					
4000	123.3704					
6000	185.0556					

Alternatively, the average of the marginal effects for the entire sample can be created. That is,

$$AME = \frac{1}{N} \sum_{i=1}^{N} ME_i = \frac{1}{N} \sum_{i=1}^{N} 2\hat{\alpha}_2 SQFT_i$$

Create the series $2\hat{\alpha}_2 SQFT_i$ using

series me = 2*@coefs(2)*sqft

Compute the summary statistics for this series.

🖂 Se	ME Wo	orkfile: BR_C					-	• >	C					
View	Proc	Object	Properties		Name	Freeze		Sample	Genr	Sheet	Graph	Stats	;] I	
						M	ÎE (Τ						
Mean			Mean			71.7	3798							•
Media	an		Median			67.4	3735	Ι						
Maxin	num		Maximum			243.	5640	Τ						
Minin	num		Minimum			20.4	1780	Τ						
Std. D	Dev.		Std. Dev.			31.0	9237	Τ						-1
Skew	ness		•		1						1		Ŀ	

The average (over all properties in the sample) estimated increase in *PRICE* for an additional square foot of living area is \$71.74. The Standard Deviation **Std. Dev.** is one measure of how much variation there is in the estimated marginal effects.

Computing the elasticity of *PRICE* with respect to house size, *SQFT*, is much the same. The elasticity of house price with respect to house size is the percentage increase in estimated price given a 1% increase in house size. Like the slope, the elasticity changes at each point. In our example,

$$\hat{\varepsilon} = slope \times \frac{SQFT}{PRICE} = (2\hat{\alpha}_2 SQFT) \times \frac{SQFT}{PRICE}$$

To compute an estimate we must select values for *SQFT* and *PRICE*. A common approach is to choose a point on the fitted relationship. That is, choose a value for *SQFT* and choose for price the corresponding fitted value *PRICE*. An efficient way to carry out the calculations is to (i) insert three additional observations into the workfile (change Range), (ii) enter 2000, 4000, and 6000 as the additional *SQFT* values, (iii) obtain fitted values from the **QUADRATIC** equation using **Forecast**, say *PRICEF_QUAD*. Then implement the command

series elas_quad = 2*@coefs(2)*(sqft^2)/pricef_quad

Open the group consisting of SQFT, PRICEF_QUAD, and ELAS_QUAD. The last three rows are

G Gro	G Group: UNTITLED Workfile: BR_CHAP02::Br\ _ □ ×										
View	Proc	Object	Print	Name	Freeze	Default	•	Sort	Transpose		
obs		S	QFT	PRICE	EF_Q	ELAS_C	UAD				
1081		2	000	11	7461.8	1.05	0303				
1082		4	000	30	2517.4	1.63	1251				
1083		6	000	61	0943.4	1.81	7408		•		

The average elasticity for the 1080 individuals is obtained similarly. In the group of series above, highlight the column *ELAS_QUAD*. Select **View**.

G GI	Group: ELAS_QUAD_GROUP Workfile: BR_CHAPO											
View	Pro	roc Object Prin		Name Freeze		Default		Sort	Tr			
obs		Ś	QFT	PRICE	F_Q	ELAS_QU	IAD					
107	9	3	3148	20	8600.2	1.4652	230		*			
108	0	6	6203	64	9145.2	1.8281	154					
108	1		2000	11	7461.8	1.0503	303					
108	2	` 4	1000	30	2517.4	1.6312	251					
108	3	6	6000	61	0943.4	1.8174	408		Ŧ			
	_	•				<u> </u>		₽				

Choose Descriptive Stats/Common Sample.

Group Members	F_Q	ELAS_QUAD
	600.2	1.465230
<u>S</u> preadsheet	145.2	1.828154
Dated Data Table	461.8	1.050303
Graph	517.4	1.631251
	943.4	1.817408
Descriptive Stats	<u>c</u>	ommon Sample

Select Sample and adjust the Sample range; click OK.

G G	roup:	ELAS_QU	JAD_GF	ROUP	Workfile		P02::Br∖		-		x
View	Proc	Object	Print	Name	Freeze	Sample	Sheet	Stats	Spec		
	(Sample								x	L
Mean		Sampre									Ы
Media	an	-Sample	e range	pairs (o	or sample	e object to	copy)-				
Maxin	num										
Minin	num	1 108	30							_	
Std. E	Dev.								OK		
Skew	nes									_	
Kurto	sis										
		IF con	dition (optional)———			1			L
Jarqu	ie-B										
Proba	abilif								Cancel		П
Sum											
Sum	Sq.										

	SQFT	PRICEF_QUAD	ELAS_QUAD
Mean	2325.938	154863.2	1.102401
Median	2186.500	129502.8	1.138600
Maximum	7897.000	1017489.	1.890364
Minimum	662.0000	62534.86	0.216145
Std. Dev.	1008.098	102272.7	0.352835
Observations	1080	1080	1080

The average of the elasticities computed at each of the 1080 sample points is 1.1024.

2.9.3 Plotting the fitted quadratic model

How well does this equation fit the data? The plot of the quadratic fit can be accomplished by using **Quick/Graph**. In the dialog box enter



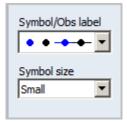
Choose the Scatter Graph type. Add a Fit line.

Graph type		
General:		
Basic graph 💌	- Details	_
Specific: Line & Symbol	Graph data; Raw data	-
Bar Spike	Fit lines: Regression Line Option	ns
Area Band	Axis borders: None	•
Mixed with Lines Dot Plot Error Bar	Multiple series: Single graph	-
High-Low (Open-Close) Scatter XY Line	C	

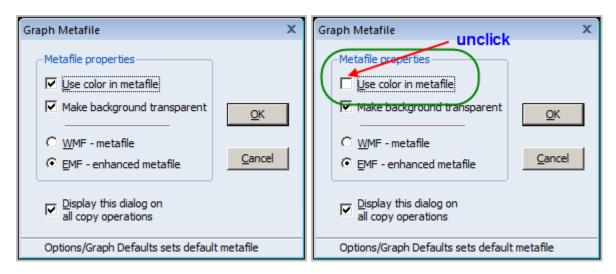
Click **Options** next to **Regression Line**. Choose **Power** for the **X transformations**. The default power is 2 so that no change is required. Select **Add**. Note that now we have two **Added Elements**.

Scatterplot Customize		
Added Elements Regression Line Add Add	Specification Y transformations: O None O Logarithmic O Inverse O Power 2 O Box-Cox 0 Robustness Iter	X transformations: C None C Logarithmic C Inverse Power C Box-Cox C Polynomial 2 ations: 4

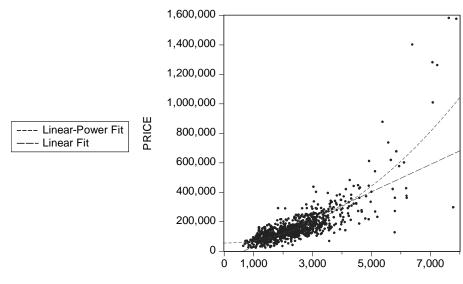
We choose to make the symbols small since there are a large number of data points:



Also, we add text to the graph. Click inside the graph to highlight the border, and enter the copy short-cut Ctrl + C. Now you have two options. If you are creating a color document, then leave the default copy settings. If your document is not in color, a reader will not really be able to tell one fitted line from the other (except that one is curved). Remove the color option:



The plot with the color removed is shown below. EViews adds a legend indicating the plot.



Linear and Quadratic Fit

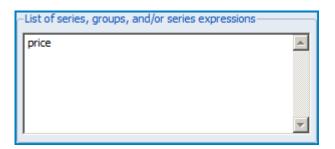
SQFT

2.9.4 Estimating a log-linear model

An alternative choice for a nonlinear relationship between house price and size is the log-linear model:

$$\log(PRICE) = \gamma_1 + \gamma_2 SQFT + e$$

Logarithmically transformed dependent variables are common when the original distribution is skewed, which is frequent with economic variables like income, and housing prices. To see this, select **Quick/Graph** from the EViews menu. First, enter the variable name *PRICE*.



Select OK. Among the Graph types choose Distribution. Under Details the Distribution is identified as Histogram.

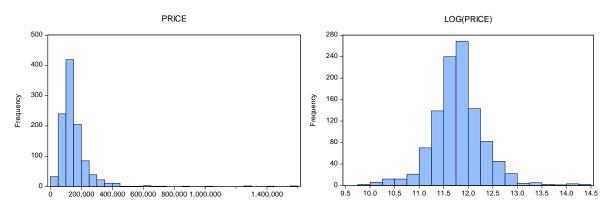
ſ	Graph type	1	-Details		
	General:		Graph data:	Raw data	
	Basic graph		Distribution:	Histogram	Options
	Line & Symbol Bar		Axis borders:	None	
	Spike Area		Multiple series:	Single graph	•
	Dot Plot Distribution Quantile - Quantile Boxplot				

Repeat these same steps but enter **log(price)** into the series list. In EViews the function **log** is the natural logarithm.

Se	ries List	х
	List of series, groups, and/or series expressions	

The two histograms are shown below. Notice that PRICE has a skewed distribution, with a long tail to the right. The distribution of LOG(PRICE) is much more symmetrical. If we can assume that the data are normally distributed, we will find that the statistical inference procedures of

interval estimation and hypothesis testing have improved properties. These ideas will be introduced in Chapter 3.



Estimation for this case uses the natural logarithmic transformation of *PRICE*. In the Command window enter

equation loglinear.ls log(price) c sqft

The resulting estimated equation is

Dependent Variable: LOG(PRICE) Method: Least Squares Sample: 1 1080 Included observations: 1080										
Variable	Coefficient	Std. Error	t-Statistic	Prob.						
C SQFT	10.83860 0.000411	0.024607 9.71E-06	440.4593 42.36484	0.0000 0.0000						

Note that the **Dependent Variable** is **LOG(PRICE)**.

2.9.5 Interpreting the log-linear model

The simplest interpretation in the log-linear model is that a 1-unit increase in the explanatory variable (*SQFT*) leads to approximately a $100\hat{\gamma}_2\%$ change in the dependent variable (*PRICE*), holding all else fixed. We can say that, for a 1 square foot increase in size, we estimate a price increase of 0.04 percent. Or, perhaps more usefully, we estimate that a 100 square foot increase will increase price by approximately 4%.

The slope and elasticity in this log-linear model are

$$\frac{d(PRICE)}{dSQFT} = \hat{\gamma}_2 PRICE = 0.000411PRICE$$
$$\hat{\varepsilon} = \hat{\gamma}_2 SQFT = 0.000411SQFT$$

The slope calculation requires a predicted value of *PRICE*. In the next section we see how to accomplish that.

2.9.6 Prediction in the log-linear model

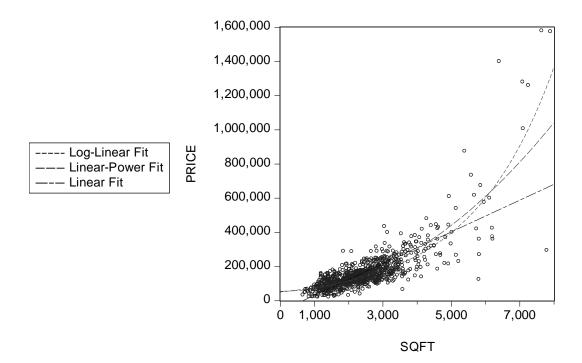
To plot the fitted line we use the same steps as for the quadratic fitted line except that we apply a **Logarithmic Y transformation**.

Added Elements Regression Line Y transformations: X transformations: C None © None
Image: Construction of the second state of the second s

Click **Add**. We can add the quadratic fitted line as well. Click **Power**, enter "2" and click **Add**. Now we have three Added Elements.

Scatterplot Customize		x
Added Elements Regression Line Regression Line Regression Line Add Remove	Specification Y transformations: None Logarithmic Inverse Power Box-Cox Robustness Itera	X transformations: None Logarithmic Inverse Power Box-Cox Polynomial None 2 4

Click **OK**, then copy and paste a non-color graph. Note that we have the option of highlighting one of the **Regression Line** entries and selecting **Remove** instead of **Add**.



Forecasting with a log-linear model requires a little care, as the dependent variable in the model regression is *LOG(PRICE)*. From within the **LOGLINEAR** regression equation click **Forecast**.

Equation: LOGLINEAR Workfile: BR_CHAP02::Br\ _ = X											
View Proc Object Print Name Freeze	Estimate Forecast	Stats Resids									
Dependent Variable: LOG(PRICE) Method: Least Squares Date: 04/19/11 Time: 14:51 Sample: 1 1080 Included observations: 1080	1										

Two options are offered under Series to forecast.

Forecast	х
Forecast equation	
Series to forecast PRICE C LOG(PRICE)	
Series names Forecast name: pricef Static forecast	,

First choose the default, which is to forecast *PRICE*, generating the new series *PRICEF*. Repeat the exercise by returning to the **Stats** panel, and click **Forecast** again.

Forecast	x
-Forecast equation LOGLINEAR	
O PRICE O LOG(PRICE)	
Series names Forecast name: Ipricef Static forecast	

Choose the **LOG**(**PRICE**) radio button and give the forecast a new name, such as *LPRICEF*. This generates the fitted values

$$\log(PRICE) = \hat{\gamma}_1 + \hat{\gamma}_2 SQFT = 10.83860 + 0.000411SQFT$$

where $\hat{\gamma}_1$ and $\hat{\gamma}_2$ are least squares estimates of the log-linear regression equation parameters. The predicted value of *PRICE* is obtained using the anti-logarithm, which is the exponential function

$$PRICE = \exp\left[\log\left(PRICE\right)\right]$$

In the EViews Command window we enter

series pricehat = exp(lpricef)

Open the four series *PRICE*, *PRICEF*, *LPRICEF* and *PRICEHAT* by selecting them in order while holding down the **Ctrl** key.

Ioglinear	
M Ipricef	4
🗹 occupancy	3
🗹 pool	
M price	4 1
M pricef	← 2 4
🗹 pricehat	

Double-click within the shaded area to open the group.

G G	G Group: UNTITLED Workfile: BR_CHAP02::Br\ _ □ X											
View	Proc	Object	Print	Name	Freeze	Defaul	t 📘	· s	ort	Transpo	ose E	
obs	;	PF	RICE	P	RICEF	LF	PRICEF		PRI	CEHAT		
1		66	6500	69	102.52	11	.14335		69	102.52		
2		66	6000	69	102.52	11	.14335		69	102.52		
3		68	3500	70	509.22	11	.16350		70	509.22		
4		102	2000	16	0036.6	11	.98316		16	0036.6		
5		54	4000	82	266.93	11	.31772		82	266.93	-	
6	•]		

The series *PRICEF* is the same as *PRICEHAT*, so we have confirmed what EViews is doing in the forecast step with a log-linear model.

By using the predicted *PRICE*, the slope expression in Section 2.9.5 can be computed at any given house size. Alternatively, the Average Marginal Effect (AME) can be computed using

series me_llin = @coefs(2)*pricef
coef(2) ame_llin
ame_llin(1)=@mean(me_llin)
ame_llin(2)=@stdev(me_llin)

ME at each observation Storage Vector Sample mean of ME Std Dev of ME

The result is

Average marginal effect of increase predicted house price	in house size (1 square foot) on
AME	61.00073
STD DEV	42.91725

2.10 REGRESSION WITH INDICATOR VARIABLES

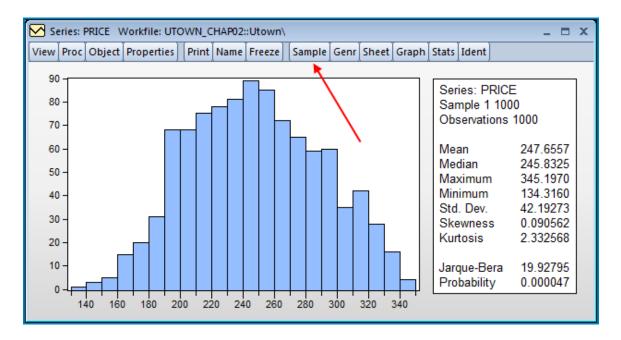
An indicator variable is a binary (0 or 1) variable that is used to represent a non-quantitative characteristic, such as gender, race, or location. For example, in the workfile *utown.wf1* we have a sample of 1000 observations on house prices (*PRICE*, in thousands of dollars) in two neighborhoods. Save the file under an alternative name, such as *utown_chap02.wf1*.

Workfile: UTOWN_CHAP02 - (c:\data\eviews\utown_chap02.wf1) _ 🗖 🗙											
View	Proc	Object	Print	Save	Details+/-	Show	Fetch	Store	Delete	Genr	Sample
_		1000 1000									Filter: *
M ag	je	1000	1000	005							
ß c ⊻fp	lace										
🗹 ро	loc										
✓ pr ✓ re											
⊠ so ⊠ut											
v u	0 WH										
			_								
<u>.</u>	Utowi	n 🔬 New I	Page /								

One neighborhood is near a major university and called University Town. Another similar neighborhood, called Golden Oaks, is a few miles away from the university. The indicator variable of interest is

$$UTOWN = \begin{cases} 1 & \text{house is in University Town} \\ 0 & \text{house is in Golden Oaks} \end{cases}$$

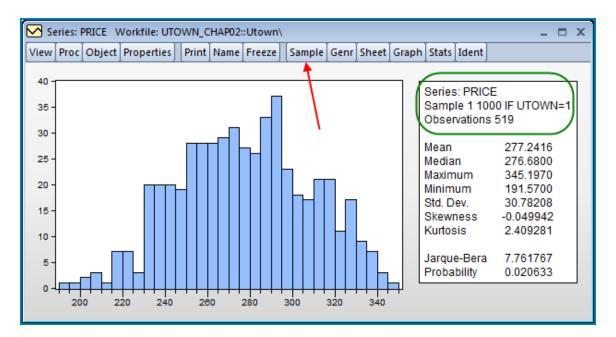
We use the **Sample** options to construct histograms for house prices in each neighborhood. Open the *PRICE* series. Click on **View/Descriptive Statistics & Tests/Histogram and Stats**. What appears is the histogram and summary statistics for the full sample of observations. Click the **Sample** button.



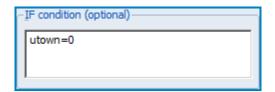
Add the **IF condition utown=1**,

Sample	х
Sample range pairs (or sample object to copy)	
@all	ОК
-IF condition (optional)	
utown=1	Cancel

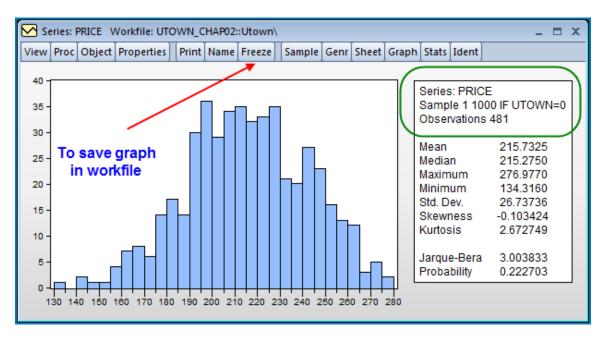
The resulting histogram is



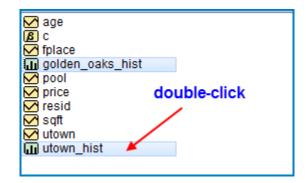
Click on Sample again. Change the IF condition to



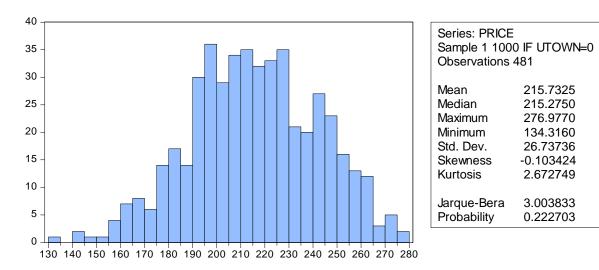
The result is

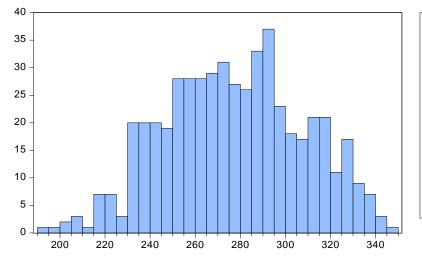


It is nice to have the two graphs in the same image. This can be achieved by selecting the two saved graphs and double-clicking in the shaded area.



The result is





Series: PRICE Sample 1 1000 IF UTOWN=1 Observations 519									
Mean	277.2416								
Median	276.6800								
Maximum	345.1970								
Minimum 191.5700									
Std. Dev.	30.78208								
Skewness	-0.049942								
Kurtosis	2.409281								
Jarque-Bera Probability	7.761767 0.020633								

A regression model using UTOWN as an explanatory variable is

$$PRICE = \beta_1 + \beta_2 UTOWN + e$$

Regression using indicator variables as explanatory variables requires no special software commands. It is the interpretation that is unusual. The parameter β_2 is not a slope, because *UTOWN* is not a continuous variable. Slopes are derivatives, and derivatives are taken with respect to continuous variables. The regression function for this model is

$$E(PRICE) = \beta_1 + \beta_2 UTOWN = \begin{cases} \beta_1 + \beta_2 & \text{if } UTOWN = 1\\ \beta_1 & \text{if } UTOWN = 0 \end{cases}$$

Before estimating the regression we must return the sample to include all observations. Click on the **Sample** button and clear any previous condition.

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Estimate the regression using the command

equation utown_reg.ls price c utown

A portion of the output is

Dependent Variable: PRICE Sample: 1 1000 Included observations: 1000				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C UTOWN	215.7325 61.50911	1.318066 1.829589	163.6735 33.61908	0.0000 0.0000

Note that the constant term 215.7325 is the sample mean price of houses in Golden Oaks. The coefficient of *UTOWN*, 61.50911, is the difference between the sample means of houses in University Town and Golden Oaks. The least squares estimates b_1 and b_2 in this indicator variable regression can be shown to be

$$b_1 = \overline{PRICE}_{\text{Golden Oaks}} = 215.7325$$
$$b_2 = \overline{PRICE}_{\text{University Town}} - \overline{PRICE}_{\text{Golden Oaks}} = 277.2416 - 215.7325 = 61.5091$$

where $\overline{PRICE}_{Golden Oaks}$ is the sample mean (average) price of houses in Golden Oaks and $\overline{PRICE}_{University Town}$ is the sample mean price of houses from University Town.

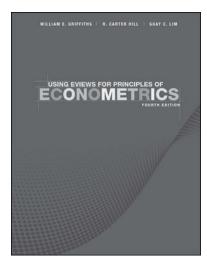
graph regression line

Keywords

average marginal effect coefficient vector covariance matrix descriptive statistics edit +/elasticity equation name.ls equation representations equation save error variance estimate equation forecast generate series genr graph axes/scale graph copy to document graph options

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residual table residuals S.D. dependent variable S.E. of regression sample mean sample range sample standard deviation scalar scatter diagram series slope, regression spreadsheet standard errors Std. Error Sum of squared resid workfile: open workfile: save



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